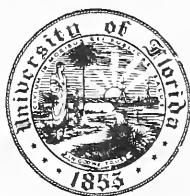


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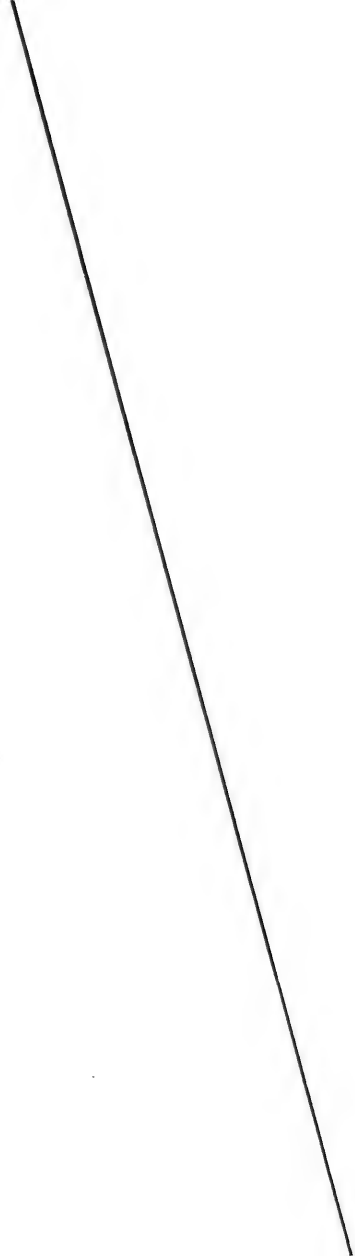
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Edited by

J. P. GUILFORD

Professor of Psychology, University of Southern California



In Association with

ANNE ANASTASI

DANIEL KATZ

HORACE B. ENGLISH

MILTON METFESSEL

G. L. FREEMAN

LAURANCE F. SHAFFER

DOUGLAS FRYER

MORRIS S. VITELES

KATE HEVNER

C. J. WARDEN

ROBERT I. WATSON

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AUTHORS

Anne Anastasi,
Fordham University.

Horace B. English,
Ohio State University.

G. L. Freeman,
Cornell University.

Douglas Fryer,
New York University and
Richardson, Bellows, Henry & Company.

J. P. Guilford,
University of Southern California.

Kate Hevner,
Indiana University.

Daniel Katz,
University of Michigan.

Milton Metfessel,
University of Southern California.

Laurance F. Shaffer,
Columbia University.

Morris S. Viteles,
University of Pennsylvania.

C. J. Warden,
Columbia University.

Robert I. Watson,
Washington University, Saint Louis.



PREFACE TO THE SECOND EDITION

Psychology has grown probably as much during the last ten years since the first edition of this volume was written as in any two or three previous decades combined. This is more true of some of its fields than of others. It is still too early to assess all the developments properly and to incorporate them into a treatment at this rather elementary level. This volume has emphasized the more enduring aspects of the fields. It is important, however, to make changes where the most significant developments have occurred. This the revising authors have attempted to do.

Specifically, the most important revisions have been as follows. Owing to the unfortunate loss to psychology of Dr. Mary Shirley by death, it was decided not to revise the chapters she had contributed. Instead, new chapters on child psychology have been written by Dr. Horace B. English. Owing to the amount of common material with educational psychology, the subject of the chapter originally contributed by Dr. English, it was believed that common authorship of these chapters would bring about improved integration and less overlapping. For the same reasons, the chapter on educational psychology has been moved to follow child psychology immediately.

There have been a number of suggestions for other minor changes in order of chapters—all different. In general, the order of the first edition received what seemed to be satisfactory approval.

Of the treatments of fundamental fields, that for animal psychology has not been modified and that for social psychology has been revised most. In the latter instance, the previous chapter on "The Psychology of Nationalism" has given way to one entitled "The Influence of the Group upon Social Behavior and Attitudes." In general, the treatments of applied fields have received more modifications than those of the basic fields, reflecting the emphasis of the wartime stimulus. The chapter on clinical psychology appears under new authorship. Dr. Louttit asked to be excused, owing to the

pressure of many new duties. At the same time, he generously offered the new author the use of any of the original material. No new chapters have been added. The first chapter has been slightly expanded in order to give the reader a quick preview of the chapters to come.

Again, the editor is most appreciative of the efforts of the authors in the cooperative undertaking. To most of them it meant an extra obligation added to prior and perhaps more compelling occupations. The service rendered should be rewarding for the extra efforts.

J. P. GUILFORD.

Beverly Hills, California

June, 1949

PREFACE TO FIRST EDITION

Frequently the second course in psychology for students in colleges of liberal arts is in the nature of a survey of the fields of psychology. This seems very appropriate, especially for those students who will complete only two semesters of psychology, and for whom it is important to learn of the varied role that psychology is playing in shaping modern thinking, and how its applications ramify throughout the whole range of human endeavor. There is no better way in which an enlightened appreciation of a subject can be imparted. Such a course is appropriate also for those students who are undecided as to a possible concentration in psychology, in that it should give them a better basis for making a decision. For those who may have decided upon psychology as their field of concentration, it should serve to guide them into the special fields that are most appealing to their temperaments and purposes. A recent study of opinion among industrial psychologists revealed a very general agreement that a course on the several fields would serve as an excellent orientation for the graduate student.

While there have been several textbooks written by single authors for such a course, the editor feels that psychology is now so specialized that it is difficult for one writer to survey adequately the significant developments in all the fields. The interpretation of a field to the student can best be accomplished by a writer who is himself immersed in that field. He then writes as an intimate insider rather than as an appraising outsider. His feeling for the right emphases, unless he is a one-sided worker in that field, can seldom be matched by that of an outsider. For these and other reasons, the editor believes that the textbook for this course should be in the nature of a symposium, written by contributors who have shown by their previous writings that they are very much at home in their respective fields.

The order of the chapters in this volume is somewhat arbitrary. They may be taught in almost any preferred sequence. The adopted sequence places the main theoretical fields first, beginning with the developmental approach. The chapters on differential psychology end

this first section, since individual differences emerge from developmental causes, from social factors, and from causes that tend to induce abnormalities. The transition from differential to educational and clinical problems is very direct. The divisions of other applied fields and their order were agreed upon after much exchange of ideas on the part of the contributors. The more special fields of physiological psychology and aesthetics do not fit readily into the sequence of the first section on theoretical fields. The somewhat abstruse subject of points of view comes appropriately after the more concrete material, when the student is more ready to appreciate the reasons for divergent systematic approaches to psychology. The omission of a chapter on experimental psychology may seem a serious oversight to some readers. The term "experimental psychology" is losing its traditional meaning, however, as a separate and distinct field. All fields are becoming more and more experimental, and so the term is coming to refer to a method rather than a field.

Concerning the eminence of the writers who have contributed to this volume nothing need be said. To these contributors the editor is most grateful for taking the time out of their unusually busy lives to labor for a project that they believed to be worthy of their best efforts. All of them very readily caught the spirit of the volume and its purposes as the editor had originally conceived it, and have come forward with the fruits of their unique experiences in psychology. Not only the editor, but the profession of psychology is indebted to them for this devotion to their science. The editor wishes to express his personal gratitude also to his wife, Ruth B. Guilford, without whose constant encouragement and aid the volume could not have been brought to completion.

J. P. GUILFORD.

Los Angeles, California
August, 1939

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CHAPTER I

INTRODUCTION

By J. P. GUILFORD, *University of Southern California*

When the history of science is written a hundred years from now, the twentieth century will probably be known as the psychological century, just as the one before it is regarded as the biological century and the ones before that as the physical and chemical centuries. The reason will be that in this century psychology made its greatest early advance and came of age, just as in the preceding century biology made a lasting place for itself among the sciences and came of age.

Human Behavior in the Modern World.—It is trite to say that the last thing in the world man has subjected to scientific study is man himself. It is also trite to say that his advances in the physical sciences have been so much more rapid than in the social sciences that human knowledge is seriously unbalanced. The critical result is that his control over inanimate forces, either for good or for ill, has increased enormously his possibilities of self-destruction. It is well recognized that these possibilities for self-annihilation must be counterbalanced by new measures of self-control and social control if man is to survive. The improvement of these controls will depend very much upon an increased knowledge of how man behaves, particularly how he interacts with his fellows. This knowledge must be supplied from its most obvious sources—namely, psychology and its neighboring disciplines, the social sciences.

It is one of the most basic principles of psychology that human actions, like those of all living creatures, are largely determined by stimulation, past and present, to which individuals are subjected. The average person today is subjected to stimulation that is exceed-

ingly complex, as compared with that of his ancestors, and very much richer in social components. The growth of populations, the trek to the cities, the increased amount and rate of travel, and particularly the perfection of modes of intercommunication are all factors bringing about closer contacts among individuals, with vastly increased interstimulation and interaction. The modern individual, as compared with his ancestors, lives in a welter of stimuli of social origin, much of it verbal, either in spoken or written form. The avenues of communication are so wide open, in most civilized countries, that we are constantly bombarded by stimulation even from the far corners of the earth. What we do or decide to do, what we feel or think at breakfast tomorrow morning may be determined to some extent by what happened in London, Moscow, or Tokyo only a few moments before. Moreover, what the masses of people do or say or think is similarly determined by the same type of stimuli.

Governments, political parties, and individuals who crave power are quick to seize upon the avenues of communication as a means of controlling the actions of people, whether their efforts be called "education" or "propaganda." Psychology is being applied as never before, through this medium and otherwise. Struggles among peoples are more than ever fought by means of cunning barrages of words rather than bullets. Whether the efforts to control other people are made with intentions that may be regarded as good or bad, the refinement in methods of control depends especially upon the discovery of psychological principles of human reactions and thinking. The development of social institutions and regulations that will permit men to live together in peace and to develop along the lines of their abilities and their desires, also requires full recognition of psychological principles. Many of these principles, it must be admitted, are as yet only vaguely understood. Many of them are already being applied without a conscious realization that they are being utilized. Many of them have been established upon a sound scientific basis but have been as yet poorly or inadequately employed. The most important problem of the present time is that of human relations, in their political, industrial, and economic aspects. Upon a reasonable solution to this problem human destiny depends.

PSYCHOLOGY AND MODERN CIVILIZATION

Why There Are Fields of Psychology.—Although the practical aims of psychology are to make better human beings and to make human beings better, the science reaches into every corner of the animal kingdom. In its broadest sense, psychology is the study of the things that all living organisms do as species and as individuals. In the study of man in particular, it is led to examine *homo sapiens* in all his forms and in all his relationships, lest some significant fact about him escape. Examining the lives of all organisms, high and low, as it does, and embracing man in his many-sided connections, psychology naturally tends to break up into definite fields. This is true not only in its attempts to discover facts and principles but also in the application of those facts and principles to human problems. The walks of life and the many problems of life that draw upon psychological knowledge are even more numerous and varied than the sources of information from which that psychological knowledge is drawn.

There are, in brief, many fields of applied psychology as well as many fields of basic psychology. In the chapters to follow we shall be interested in both kinds of fields; those that search for psychological knowledge and those that use that knowledge. We shall see what kinds of things the psychologist does as a scientist in his laboratory and in his field research, and we shall see what he does in his clinic and office where he functions as a new kind of human engineer. We shall see how his discoveries are leading to changes in human thinking and in human attitudes, touching the lives of multitudes of people who do not even come in contact with him.

How Psychology Changes Ways of Thinking.—As an example of how a new science can turn the ways of thinking of people into new directions, we may cite the teachings of Darwin concerning the evolution of species. As an example from earlier history, the teaching of Copernicus that the earth is not the center of the universe will serve. Such revolutionary ideas not only change human thinking but also people's ways of living and acting as well. The teachings of psychology now have, and will probably continue to

have, an even more important influence upon people's ways of looking at life, particularly with respect to themselves and their associates. The science has wrought no sudden revolution, such as that provoked by Darwin, possibly because we are now more prepared for the changes that it is bringing about. But the changes are none the less real, and doubtless just as profound.

Attitudes toward Misbehavior.—It is one of the aims of the chapters that follow to suggest what some of those important changes are. Even when not pointed out explicitly, those changes may be seen by implication by one who is alert to read between the lines. As an example, consider the general attitudes of parents and others toward misbehavior. The traditional causes to which misbehavior has been attributed include such things as "temptations of Satan," "animal instincts," "bad heredity," or "sparing the rod and spoiling the child." Naming one of these "causes" often excused the parent or teacher of blame or led to drastic efforts to counteract the "bad" influence by measures that may have left the child in an even less desirable condition than before. Psychology, on the other hand, considers misbehavior, like all behavior, as the outcome of natural forces working in more or less well-known ways. The solution is to discover what forces are operating in any particular child and to apply the necessary corrective measures. The psychologist's attitude toward misconduct is much like that of the medical doctor toward a physical disease or defect. A disorder must be carefully diagnosed and then treated.

The Clinical versus the Personal Attitude.—As another example, consider a very closely related problem—that of the relative seriousness of different kinds of misconduct. Parents, and many teachers, too, have been questioned on this subject. They almost invariably place at the head of the list of serious misdemeanors such things as stealing, cheating, lying, disobedience, obscene talk, swearing, smoking, and the like. Psychologists, on the other hand, are more inclined to place among the more serious types of behavior such things as fits of depression, unusual fears, cruelty, constant whining, withdrawing from social contacts, sulkiness, and the like.

The difference is one of fundamental point of view. Parents, and many teachers, regard as most serious that behavior which transgresses conventional moral standards, or is in opposition to parental control, or is disrupting to the comfortable routine of home or school. Psychologists, on the other hand, look for the symptoms of graver maladjustments to come. They are disturbed at signs of the child's unusual withdrawal from life situations, of nervousness, and of unusual ways of getting what he wants, for example, by means of temper tantrums. They know that certain habits, if persisted in, will later make the individual ineffective and unhappy. No one, of course, not even a psychologist, condones infractions of the moral code, such as stealing, lying, and the like. The psychologist, however, recognizes that such infractions are often less prophetic of a disastrous future for the child than other kinds of symptoms that he may take more seriously. He knows, too, that adult crime often grows out of childhood maladjustments as indicated by those symptoms.

We might summarize these two different outlooks on misbehavior by saying that the parent exhibits a more personal, moral attitude, in that he is concerned about behavior that disturbs him or will reflect upon him personally, whereas the psychologist takes a more impersonal, clinical attitude, in that he cares less about the immediate consequences of the child's act than he does about the child's future development into an effective, useful, happy adult. The time will undoubtedly come when parents and teachers will catch more of the clinical spirit in dealing with troublesome behavior in their young charges. When they do, we will see a vast improvement in the way in which the young are brought up and a marked decrease in wastage among adults.

Other Ways in Which Psychology Touches Modern Life.—

These examples are only two of many that show how psychology is changing modern life. They have to do with the rearing of children. Other phases of life could readily be mentioned as examples, but these must be left for later chapters. Suffice it to say that the field of education, for example, is continually undergoing revisions, from the kindergarten through the graduate school, largely

because of psychological discoveries and practices. A careful comparison of textbooks, examinations, and other aids to teaching with those employed a hundred years ago—or even thirty years ago—will show radical changes. The introduction of psychological tests has given to education certain indispensable tools for adjusting the child to the school and the school to the child, for vocational guidance, and for other useful purposes.

The psychologist has also found applications for his science in the market place, the industrial plant, the penal institution, the medical clinic and hospital, and political affairs. In fact, wherever human beings must be dealt with, wherever their selection, their guidance, their training, their attitudes, preferences, and interests are concerned, there is a place for the use of psychological knowledge and methods. For a fuller survey of the role of psychology in all these spheres of life, the student is referred to later chapters.

GENERAL PLAN OF THE VOLUME

The sequence of the fields followed in the chapters of this volume is only one of several that might be defended. In general, the first chapters are devoted to basic fields and the later ones to applied fields, with a few exceptions. The account begins with animal psychology for several reasons. The origin and development of human thought regarding the behavior of living organisms in general is best told in relating the growth of animal psychology. Changing conceptions of life, of human nature, and of mental phenomena—in fact, conceptions in philosophy in general—run parallel to changing attitudes toward animal behavior. For those who believe that human characteristics have undergone a long course of development from simpler to more complex forms, the study of lower-animal behavior is very significant. One does not need to subscribe to the idea of human evolution, however, in order to appreciate the findings of animal psychology. Many a principle that helps us to understand human nature has been discovered by the study of lower animals. Furthermore, as in the medical and physiological fields, many a study of animals cannot be duplicated with human subjects owing to their costliness in terms of human comfort and life.

With child psychology following animal psychology, the develop-

mental principle is extended at least through the first four chapters. Probably very few psychologists, or other scientists, now hold to the idea that "ontogeny repeats phylogeny" (individual human development duplicates racial development). On the other hand, the child's development, including his embryological life, furnishes a link between animal psychology and human adult psychology. Some regard the link as providing continuity; some as providing intermediate levels of psychological functioning; and some as both. Certainly, most thinkers regard the study of childhood and adolescent stages not only as very important for the promotion of optimal growth of individuals but also for understanding how adults become what they are. Since educational psychology is a technology which aims to find the means of promoting optimal development, particularly during childhood, although it is an applied field it has been treated following the chapters on child psychology.

Social psychology, although one of the latest fields to yield to scientific approach, is of such human importance in view of what was said earlier that it has been given liberal space. Its position close to child psychology is natural because the child's development is so much dependent upon the kind of stimulation to which he is subjected and because that stimulation is so largely social in origin. Social psychology is rapidly changing, and there is no universal agreement as to what its boundaries should be or what its most important concepts are. The treatment represented in this volume and the topics emphasized are probably in line with what a majority of psychologists who specialize in that field would accept. The student would probably find a somewhat different emphasis in a treatment of this field by a sociologist. Such a divergence is understandable in view of the differences in background and approaches of psychologist and sociologist.

Abnormal psychology treats the subject of abnormal behavior. Abnormal behavior is action that deviates markedly from the common or expected, or that falls notably short of social standards. Abnormalities vary all the way from minor departures (subnormal performance, "queer" actions, and the like) at the milder extremes, to serious transgressions, dangerous or insane actions, or a helpless condition at the other extreme. The recognition that there are nervous and mental diseases as well as physical diseases is one of

the great steps forward in modern thinking. The revolution in human attitudes toward the insane and the neurotic is not complete but it has been radical in character. The limited, although substantial, growth of understanding of abnormal behavior has not only improved the chances of helping victims of it and of preventing it in others but has also advanced considerably our knowledge of the normal individual.

One of psychology's most significant contributions to human welfare is in the study of individual differences, in other words, differential psychology. Human differences in abilities, interests, and temperament enter as factors in many of the common policies and practices that have to do with the education, government, and welfare of people generally. The basic facts of those differences—the kinds, their extents, their causes, and their consequences—are important to large numbers of the professions that deal with people and to law-making and law-enforcing agencies.

Clinical psychology is an applied branch that deals most directly and intimately with problems arising from unusual deviations of behavior from acceptable norms. The clinical psychologist represents a rapidly growing profession which takes its place alongside of general medicine, psychiatry, and social work in dealing with individuals in need of a more effective adjustment to their environment.

Other applied fields, treated following clinical psychology, have to do with a variety of problems which come under the general headings of vocational psychology and industrial psychology. Vocational problems include, on the one hand, the selection of personnel who in their assignments are likely to give the maximum satisfaction to those who hire or supervise them as well as to themselves. On the other hand is the general problem of classification of personnel. This takes the form of educational and vocational guidance of youths and adults who wish to know how to plan their own development and to make a wise choice of vocation. It also takes the form of making the most suitable work assignments and promotions of those already accepted for employment in public or private organizations. Because of the long periods of training now required in preparation for so many vocations, and those periods will prob-

ably increase, it is very important that young people avoid as much as possible the mistakes often made in choosing a vocation. Employers keenly feel the need of better procedures for avoiding costly turnover and for promoting the right personnel to supervisory and administrative positions. For the worker on the job, there is need of knowing efficient methods of learning and of work, and of knowing what environmental and managerial features will promote not only a high level of production but also high employee morale. Not to be overlooked in this very brief sketch of psychotechnology are applications to other professions—medicine, dentistry, law, aviation, advertising, and merchandising, all of which will be touched upon in later chapters.

The last three chapters treat basic subjects, but they represent fields of less general interest than those presented earlier. Physiological psychology is the oldest field to receive scientific study. It developed because philosophers, who were struggling with problems of the human mind, turned to the physiological laboratory to find out how the sense organs, the nerves, and the brain function to provide conscious awareness and knowledge. From this beginning, procedures were developed for the systematic and controlled study of mental processes and functions themselves. The close connection of mental and behavioral processes in general with organic events in the body has always been an impressive fact; so that as psychology has extended its scope, the investigations of those connections have kept pace. To “explain” a conscious or behavioral event on the basis of some bodily event yields intellectual satisfaction to many an investigator. In many ways it also suggests new ways of controlling behavior, for example, through the use of drugs, nutrition, gland therapy, and the like.

Esthetics has been tied to its maternal apron strings of philosophy longer than many other branches of knowledge. While science cannot provide all the answers where questions of value arise, it can study objectively the reactions of individuals under stimulation from objects or situations that are labeled as beautiful or ugly or as humorous or as tragic. From this point of view it is not out of order to state that esthetics is really a branch of psychology.

The final chapter presents some of the theoretical background of

psychology. There has not always been peace within the psychological family. There have been many different opinions as to what psychology should be and what it should do, as well as opinions about how it should obtain its data and interpret its results. From time to time, new "schools" of psychologists or new points of view arose. New movements usually grew out of certain dissatisfactions with the old and reacted against them. Each has had something of permanent value to add to the general body of psychological knowledge. Not all of the issues that these conflicts aroused have been resolved, but reconciliations on many points have eventually resulted. At the present time it can be said that no new school of serious pretensions has been initiated during the past quarter century, a symptom of the relative condition of peace that now prevails.

One important field of psychology has not been given appropriate space or notice in this volume—the field of experimental psychology. There are several reasons for this. Originally, experimental psychology was almost indistinguishable from physiological psychology. Nearly a hundred years ago it was the new laboratory psychology in contrast to the philosophical or "armchair" psychology. Its early investigations were based upon the normal, human adult, and its aim was to describe and to understand the typical human mind. While laboratory psychology has continued through the years making studies of the mental operations of normal adults, the experimental approach has been extended to all the special fields until no one field can lay claim to it as its own. The normal, human adult will probably continue to be the common reference point. The content of a course on "general psychology" or "introductory psychology" usually starts from this reference point and keeps it as central. There would be little that is unique, therefore, to present under the heading of "experimental psychology" except a discussion of experimental method, its logic, its techniques, and its procedures, as applied in a general psychology laboratory. It is hoped that, in the presentation of special fields in the chapters that follow, the application of experimental method to psychological study will be amply illustrated. Its details as applied to the normal adult are best appreciated by undergoing experience in the psychological laboratory.

CHAPTER II

ANIMAL PSYCHOLOGY (VIEWPOINT AND PROGRAM)

By C. J. WARDEN, *Columbia University*

INTRODUCTION

Animal Psychology Began with Aristotle.—Animal psychology is as old as human psychology and the other biological sciences. It was founded by Aristotle, under the patronage of Alexander the Great, in connection with his pioneer attempt to systematize the field of natural science. Many years were spent in collecting, classifying, and interpreting all the available facts and folklore of the times, relating to the mental life and behavior of animals. First-hand observations were made, also, by Aristotle and his coworkers, on a wide variety of animal types. This material was finally brought together in the *Historia Animalium* and *De Anima*, the latter volume being a comparative treatment of man and animal.

It is easy enough to criticize these works in the light of our modern knowledge. For example, when observational facts were lacking, Aristotle often filled in the account with anecdotes and hearsay. Moreover, he was a thorough-going vitalist and hence his interpretation of animal activities was teleological and anthropomorphic. Nevertheless, his contribution toward the development of animal psychology was greater than that of any other writer up to the time of Darwin. A brief account of the more important findings and theoretical viewpoint of Aristotle will be found in a recent volume by Warden.¹

Animal Psychology during the Middle Ages.—After Aristotle, animal psychology shared the common fate of the natural sciences for two millenia or more. As is well known, this was a period of general decadence in science. The later Greeks turned their attention from science to speculative philosophy and ethics. The center of

¹ Numbers like this ¹ throughout the volume indicate references listed separately at the end of each chapter.

interest for the Romans was politics and imperialistic ambitions. During the early part of the Christian era, the normal interest of mankind in natural science was largely displaced by zealous religious activities. The works of Aristotle on animal psychology were either ignored or proscribed, along with many other pagan treatises on science. This condition continued well through the Middle Ages, the ban being finally lifted about the beginning of the thirteenth century. Once this occurred, the works of Aristotle soon became the source of final authority in the field of natural history. This attitude tended to prevent the development of direct methods of investigation. As a matter of fact, little or no genuine advance took place until the revival of natural science in the sixteenth century.

Animal Psychology Revived by the Naturalists.—From this time forward, rapid strides were made in the development of most biological fields. Numerous books on natural history appeared, based upon new observations, in which considerable attention was given to the behavior of animals. Somewhat later, special treatises were published dealing separately and more intensively with fishes, birds, insects, and other animal groups. The microscope was invented near the beginning of the seventeenth century and this soon led to the discovery of the unicellular organisms. The published reports of naturalists and explorers supplied important information concerning the behavior of animals in distant lands. As the author has shown elsewhere,² the accumulation of knowledge was favored by refinements in observation and by the opening up of new lines of approach.

This great advance in knowledge tended to stimulate new speculations concerning the nature of the animal mind. Some naturalists adopted the view of Aristotle and ascribed human-like qualities to the higher animals. Others made a sharp dichotomy between the mental life of animals and man. They argued that animal activities are guided by divinely implanted instincts which vary from species to species. Man alone possesses reason and the capacity for voluntary activity involving moral and spiritual responsibility. This view was fostered by the theological demand that the primacy of man should rest on a definite, qualitative basis. In contrast to these older theories, the position of Descartes reflected the developing thought of the seven-

teenth century. He held that even the higher animals are merely living machines and possess no mental life. Their activities are simply the automatic functioning of the natural body structure. Thus all the behavior of infrahuman organisms can be explained, so he insisted, in terms of mechanistic, physiological principles. Such a radical view at this time indicates very clearly that leaders in the field of animal psychology no longer felt bound by authority and tradition.

The Influence of Darwin.—The rate of development was greatly increased by the publication of Darwin's *Origin of Species* in 1859. Previous to this time, there had been no central problem around which the interest in animal psychology might crystallize. The theory of evolution, as proposed by Darwin, offered a problem both urgent and broad in scope. The concept of mental continuity in all living organisms aroused a new and widespread interest in the mental and behavioral life of animals. It ushered in the modern epoch in comparative psychology. The movement thus begun led in time to the establishment of the science as a separate biological discipline. Perhaps there is no better way to come to an understanding of the present-day viewpoint and program of the science than by tracing briefly the major developments that have occurred since that time. In making such a survey, it will be convenient to treat in order the two following periods of the modern epoch:

The Anecdotal Period (1859-1890).

The Experimental Period (1890-).

THE ANECDOTAL PERIOD

The Question of Mental Evolution.—According to Darwin's theory, all living organisms fall into a natural phylogenetic sequence. The thread of causal continuity begins with the simplest animals and ends with man, the highest and most complex type. This continuity is not only structural but also functional and mental. It involves the type and the series of types as a whole. He sought to explain this evolutionary sequence in terms of the principles of variation and natural selection. When variants from an existing type possessed new characters that had survival value, they were likely to become new types in time under proper conditions of segregation and

inbreeding. Darwin had collected considerable evidence for structural evolution before he proposed his theory. Within a few years, a large body of interested workers supplied enough additional evidence to convince the scientific world on this point. It was necessary, however, to demonstrate mental evolution in order to establish Darwin's proposal as a general theory. It is small wonder, therefore, that a large part of the writings of Darwin was given over to speculation and argument concerning the evolution of mind and behavior.

But here the evolutionary school ran into a number of serious difficulties. In the first place, very little accurate information was at hand bearing upon the mental capacities of even the more common animal types. Systematic observation and experimental methods did not emerge until several decades later. In the second place, many leading thinkers of the day were strongly opposed to a theory which linked human mentality with that of the animals. They were willing to admit that man's body might very well be a heritage from lower ape-like creatures. Nor did they object to the notion of mental evolution as applied to infrahuman organisms. They insisted, however, that there was a wide chasm between the mentality of the higher animals and that of man which the theory of evolution could not bridge. The intellectual, moral, and spiritual aspects of the human mind were special gifts from the gods and had no connection with the evolutionary process. This view was held at first even by such ardent evolutionists as Wallace and Huxley.

The Development of Instincts and Intelligence.—The first task of Darwin was to show that simple instincts tend to become complex as animal types increase in structural complexity. This should be true, according to his theory, because functional complexity would be likely to possess survival value in such a case. Thus structural and behavioral elaboration arose together naturally through the operation of the same evolutionary mechanism. The second task of Darwin was to show that a rudimentary intelligence arose from time to time out of a matrix of complex instincts. Once a connection between instinct and intelligence could be demonstrated, the further evolution of the latter might be taken for granted because of its survival value. However, the notion that instinct and intelligence are continuous phases

of mental evolution was contrary to current opinion. For centuries the view had prevailed that instinct and intelligence are antithetical in nature, the one characterizing animal and the other human activities. It was only after long years of controversy that Darwin's conception was accorded general acceptance.

According to Darwin, intelligence is common to both the higher animals and man, although it has reached its most complex elaboration in the latter. One should expect, therefore, to find that animals most closely akin to man possess a rudimentary intelligence of the human sort. In the last analysis, the crucial problem for Darwin was to demonstrate that this was really true. If this gap could be bridged, complete mental continuity would be demonstrated and the general position of the evolutionary school would carry the day.

The Development of Human Morals and Spiritual Life.—As noted above, the supposedly distinctive human traits are those comprising the intellectual, moral, and spiritual life of the race. With keen insight, Darwin saw that these capacities rested upon a highly developed social life. In such a situation, so he argued, sympathy, mutual aid, parental and filial affection, and the like would possess group survival value. He further insisted that "any animal endowed with well-marked social instincts, would inevitably acquire a moral sense or conscience" as soon as its "intellectual powers" evolved up to or near the human level. He realized, however, that mere argument was not enough. The search of Darwin and his followers for concrete evidences of rudimentary human-like traits in the higher animals ushered in the anecdotal movement.

Anecdotalism.—The only evidence readily available at this time consisted of anecdotes describing the unusual exploits of animals. These were collected by the protagonists of evolution from published sources, private correspondence, and mere hearsay. Scores of such collections appeared during the three decades following the announcement of Darwin's theory. The dog, cat, horse, elephant, and monkey were the general favorites, although the social insects were often included. Some of these anecdotes were taken from unreliable sources, but most of them were dependable enough as mere stories. In any

case, the exploits reported were so interpreted as to eulogize and humanize the animal's conduct. Even the more commonplace acts of the higher animals were made to appear "almost human" in their absurd anecdotal setting. One can hardly expect to capture the real spirit of the times without reading selections from Romanes³ or similar collections.

Anecdotes Usually Humanized the Higher Animals.—In general, these anecdotes were intended to exemplify such human-like capacities as the following in the higher animals: (1) Reasoning ability, (2) social cooperation, (3) primary emotions and sentiments, and (4) a rudimentary moral sense. Reasoning ability was presumably indicated by the fact that animals are able to learn tricks, avoid capture by traps, outwit man at times, and the like. Stories purporting to show the use of signs or sounds by two animals in planning together the capture of prey were offered as evidence of social cooperation. The domestic animals provided the source of numerous anecdotes illustrating sympathy, curiosity, jealousy, emulation, and other emotions. The anthropomorphic tendency reached the ridiculous, however, in the attempt to show that the higher animals exhibit a sense of shame, a sense of justice, and other moral sentiments. The underlying assumption seemed to be that in so far as an animal behaves like man it must also feel like man.

Criticisms of the Anecdote.—The following criticisms may be urged against the anecdote as a source of scientific information regarding the mental life and behavior of animals:

(1) That the observer is likely to be untrained and unable to give an accurate account of the happening, even if his intentions are of the best; (2) that interpretative elements are likely to be confused in the report with factual elements, making it impossible for the scientist later to separate the two; (3) that the happening even when adequately reported is usually an incident cut off from the essential genetic antecedents (both individual and phyletic) which would explain it and give it proper significance; (4) that the happening, in the nature of the case, represents highly selected and atypical behavior that can have little or no statistical validity; (5) that even if the tendency of

mankind to humanize the animal—whether in a scientific or a literary mood—is restrained, errors of memory and of transmission (if verbal) are likely to enter; and (6) there is the difficulty of selecting reliable, authentic material from the various available sources. It is evident that the method, even when guardedly employed, which usually was not the case, hardly deserves to be considered scientific in the strict sense.

The Value of the Anecdote.—The anecdotal collections were widely read and the popular imagination was deeply stirred. The use of such evidence by the sober scientists of the day is to be explained in large part by the bitter controversy that raged over the doctrine of mental continuity. Although such evidence possessed little or no real value, it was an important influence in the final establishment of the evolutionary theory. Moreover, the tendency to humanize, while an error, was effective in breaking down the traditional distinction between the mental life of man and animal. The chief value of the anecdotal movement, however, was in keeping alive the broad interest that had been aroused in the field of animal psychology. In time, this interest was divorced from the controversy over mental continuity and turned in the direction of scientific investigation. This transition occurred about 1890 and ushered in the experimental period which has continued up to the present.

THE EXPERIMENTAL PERIOD

The new movement began as a revolt against the method and viewpoint of the early post-Darwinian school. The doctrine of mental continuity had been generally accepted, hence there was no further need to use anecdotal material. For the same reason, the urge to humanize animal behavior had become less pressing. There was a growing tendency to study animal activities for their own sake, quite apart from the earlier controversial setting. At first, the anecdote was replaced by careful and systematic observations of behavior. Somewhat later, simple experiments of the laboratory type were introduced. This required the invention of special methods and techniques in a hitherto unworked field. During the past half-century, the experimental approach has gradually come to play an increasingly

dominant role in the science. This expansion has been paralleled by a remarkable development in the elaboration and refinement of laboratory methods. As might be expected, this shift in content and emphasis was accompanied by important changes in theoretical viewpoint. In order to understand the present position of the science, a brief review of the major developments of the period will be necessary.

The Pioneers.—The new movement arose about 1890 from the pioneer work of four great leaders: Lubbock, Morgan, Loeb, and Verworn. Sir John Lubbock was an English naturalist and statesman whose interest in the behavior of insects can be traced back to the personal influence of Darwin. Lloyd Morgan was an English biologist and thinker who studied extensively the behavior of the higher vertebrates. Jacques Loeb and Max Verworn were both physiologists of the German school who sought to analyze the activities of the lower organisms along rigidly scientific lines. For quite a time, each of these leaders worked independently of the other in his chosen field. Each devised and applied experimental methods and each developed his own particular point of view. When these four lines of work converged into a single movement, the success of a truly scientific animal psychology was assured.

Lubbock was the first of this group to make use of experimental methods, his collected studies on insect behavior appearing in 1882. He invented the maze method and the problem method for use in this field. He devised the technique of marking individuals so that their movements could be accurately traced. He was the first to present the results of behavioral investigations in tabular form showing individual variations and group averages. He formulated the principle now utilized in most experimentation that animal intelligence should be tested by placing between the organism and some natural incentive an obstacle "which a little ingenuity will enable them to overcome." After years of research, he published a volume on the *Senses, Instincts, and Intelligence of Animals* without including a single anecdote. Lubbock was far ahead of his time both in method and in viewpoint.

Morgan was the first to apply experimental methods to the study of behavior in the higher vertebrates. He compared the instinctive

repertory of numerous species of birds and mammals and devised simple tests to determine their mode of learning. He originated the incubator technique, in order to eliminate the possibility of early parental influences on the unfolding of instincts in birds. In 1896, he delivered a course of lectures at Harvard and Chicago Universities which were later published as *Instinct and Habit*. As we have shown elsewhere,⁴ these lectures stimulated directly the rise of experimental work in America. Previous to this time he had developed the concept of "trial and error" learning which has since played a prominent role in general psychological theory. Perhaps he is best known, however, in connection with the canon which he formulated in his *Comparative Psychology* in 1894. Morgan's canon runs as follows: "In no case may we interpret an action as the outcome of the exercise of a higher psychical faculty if it can be interpreted as the outcome of one which stands lower in the psychological scale." This is merely the law of parsimony, long accepted in the natural sciences, applied to the field of animal psychology. This canon eventually gained wide acceptance and was most effective in substituting a saner interpretation of animal behavior for the humanizing of the anecdotal period.

The early work of Loeb was confined to the plant-like, sessile coelenterates. He found that these lowly organisms bend directly toward or away from light, gravity, and other stimuli. Such orientational responses, or tropisms, in plants had long been regarded as unconscious, physicochemical processes. Loeb's findings led him to believe that the behavior of lower animals, like that of plants, is tropistic in character. In time, he extended this concept to cover practically all instinctive behavior. He denied mental life to all but the higher animals in which the ability to learn could be demonstrated. This position was similar in general to that of Descartes mentioned in an earlier section, although somewhat less radical. It was much more extreme than the viewpoint represented by Morgan's canon. While it was rejected by many, it was an important influence in turning the tide away from the anthropomorphism of the previous period. In time, it became the fashion to believe, with Loeb, that the insect is forced to fly into a candle flame, and to treat as old-fashioned the notion of Romanes that it does so out of innate "curiosity."

Verworn extended experimental methods to the motile unicellular organisms, or Protista. His extensive researches in this field were published in 1889 as the *Protistenstudien*. His pioneer work on the lower organisms was extended and elaborated later by Jennings,⁵ one of his foremost pupils. Verworn developed a tropism theory much less radical than that of Loeb. He held that the reactions of lower organisms are determined to a large extent by internal factors, or physiological states. Such motile types as he studied did not, so he found, orient directly to external stimuli after the manner of sessile animals and plants. Nevertheless, he regarded the internal determining factors as physiological rather than mental. He did not attempt, however, to extend this viewpoint to the more complex multicellular types. His main contribution was in opening a new field to experimental analysis. As we shall see, the findings of Verworn and his students on the behavior of the lower organisms assumed considerable theoretical importance at a later time.

Later Developments.—The work of the pioneers, while of outstanding importance, represented the mere beginnings of the science as we know it today. They had done little more than point the way by devising a few simple methods and applying these to a relatively small number of animal types. There still remained the task of broadening the experimental approach by the invention of new and more adequate methods and the adapting of these to many divergent types of animals. Obviously, the gradual building up of a large body of systematic facts worthy of the name of a science depended upon later developments in this direction. It will be of interest to note a few of the more important lines of advance that occurred later in the extension of experimental methods. A more complete survey of this period of rapid growth will be found in other connections.⁶

The decade centering around 1900 witnessed a remarkable outburst of animal experimentation among psychologists and biologists. Jennings⁷ had begun his extensive work on the unicellular organisms, and had demonstrated "trial and error" activities and simple habit-formation in these lowly types. Studies on learning in the more complex invertebrates were carried out by various workers in Ger-

many, France, and America. Yerkes adapted the maze method to the crab and the crayfish, and Thorndike devised the compartment maze for fishes. Many investigations were made, during this decade, on the behavior of the social insects—a continuation of Lubbock's line of research. The work of Morgan on birds was considerably extended by Thorndike, Kline, and other American psychologists.

Experiments Extended to Mammals.—The most important advance of the decade by far was the extension, for the first time, of experimental methods to the mammals. Up to this time only observational studies had been made on this group. In fact, it was commonly believed that these higher animals could not be tested profitably under artificial laboratory conditions. This new line of experimentation was initiated, about the turn of the century, by Thorndike at Harvard, by Kline and Small at Clark University, and by Pavlov in Russia. Thorndike carried out an extensive series of experiments on dogs, cats, and monkeys by means of numerous problem-boxes which he invented for the purpose. His analysis of learning and imitation in these animals excited wide interest and stimulated further research. Kline and Small studied learning in the white rat on specially devised problem-boxes and mazes. As is well known, this animal soon became the favorite type for laboratory use. The Russian physiologist, Pavlov, discovered the conditioned-reflex in the dog and thus opened up a new and important line of research. The work of these several leaders has served as a model for much of the later experimentation on the mammals.

Methods of Animal Psychology Extended to the Study of Man.—The extension of experimental methods to the higher animals was effective in stimulating the broad movement that has continued to the present time. It meant to the psychologist that many of the problems relating to learning and intelligence in man could now be approached from the genetic angle by utilizing animal studies. Once this was realized, laboratories were set up in the leading American universities, and periodicals devoted to animal research were established. This led in turn to the development of new and improved methods and to the gradual accumulation of a body of systematic facts concerning

the behavioral life of animals. The steady growth of the experimental movement, during the past three decades, has been reviewed at some length in a recent paper by the present author.⁸

The Objective Viewpoint.—As we have seen, the tendency to humanize animal behavior without restraint had been discarded by the pioneers at the beginning of the experimental period. This did not mean, however, that the principle of anthropomorphic interpretation had been wholly abandoned. As a matter of fact, Morgan's canon merely insisted that such interpretation be made with reasonable sanity and caution. It was still the common belief that animal studies could hardly be classed as psychological unless inferences were drawn regarding the mental states involved. It is clear that such inferences must be based, in the last analysis, upon comparison by analogy with the mental states of man in corresponding situations. Several decades passed before this principle of anthropomorphic analogy was rejected in favor of a definite objective viewpoint. During this time, a number of speculative problems regarding the nature of the animal mind were widely discussed. Certain of these will be briefly noted here, in as much as they had a direct bearing upon the final emancipation of animal psychology from mentalistic influences.

The Question of Consciousness in Lower Animals.—The question of the proper criterion to be used to determine the presence or absence of consciousness in animals occasioned no little controversy. Loeb held that the ability to learn was the only dependable evidence of consciousness. Lubbock and Morgan argued that such a criterion was purely arbitrary, since an animal might be conscious while performing reflex and instinctive acts. They believed that all living organisms possessed at least a vague consciousness of some sort. To deny this was to raise the problem as to when and how consciousness first appeared in the evolution of animal types. In any case, the criterion of Loeb lost its meaning as soon as Jennings had demonstrated that even unicellular organisms are able to learn. These new facts seemed to support the opinion of Lubbock and Morgan that life and consciousness are coextensive. Such a view fitted in perfectly well with the prevailing doctrine of mental continuity.

Levels of Mental Activity.—The speculative emphasis then shifted to the problem of establishing a scale of psychic levels to be used in classifying animals. Morgan proposed a scale of three levels as follows: (a) *Sentience*—a dim awareness, probably possessed by the simplest organisms; (b) *effective consciousness*—associated with the use of past experience in guiding later activities; and (c) *self-consciousness*—associated with analytical reasoning ability. The latter level, so he held, presupposed a complex central nervous system and the use of language and is possessed only by man. A number of similar scales were developed by others. In all cases, the placement of a species in the psychic scale was to be made after noting the complexity of its bodily structure and behavior. It is obvious, therefore, that the assigned mental status would be a mere inference rather than a directly observed fact. Moreover, even if such a scale were acceptable its application might well be regarded as of doubtful value. What would be gained, indeed, by bringing the animal world under such a simple, three-level, psychological classification?

Behaviorism Appears.—About 1912, Watson⁹ made a vigorous attack against all such speculations regarding the nature of the animal mind. He pointed out the fact that these attempts to delve into the mental life of animals had done nothing more than arouse futile controversies. These can never be settled, because the mental life of animals cannot be directly observed by man. He insisted that to try to infer their mental life from structural and behavioral complexity is merely to fall back on the principle of anthropomorphic analogy. But this principle is not logically sound; it is merely reasoning in a circle. The inner life of animals, if such they have, is forever hidden from human observation. Clearly then, it lies outside the field of scientific investigation. All attempts to interpret animal mentality turn out to be pretentious and useless speculations. In order to be truly scientific, animal psychology must reject the principle of inference by analogy and thus rid itself of the last vestige of anthropomorphism. In the final analysis, Watson had simply followed to their logical conclusion the arguments raised by the pioneers against humanizing animal behavior.

On the positive side, Watson proposed that the animal psychologist investigate stimulus-response relationships, as observed in the laboratory and the natural environment. Since the terms involved are both objective, such a treatment would bring animal psychology definitely into the field of the natural sciences. As he pointed out, the prediction and control of behavior would thus become possible without dragging mental analogues into the description at all. The behavior of the organism as a whole is to be regarded as a self-explanatory system, since complex activities may be analyzed into simple acts. The concept of behavioral levels thus supplants the older notion of psychic levels. Animal activities may even be rated as to the degree of intelligence exhibited, without recourse to mentalistic terms. For intelligent behavior is characterized by successful adjustment to environmental situations, and this factor can be checked objectively. Whatever one may think of the extension of Watson's position to the human field, it would seem to be entirely proper and adequate for animal psychology. Although there was some opposition at first, this objective principle has now become the settled viewpoint in the science.

As noted in this brief survey, a remarkable series of advances have occurred during the period which began about 1890. At the very beginning, anecdotal content and the more extreme humanizing interpretation were both thrown overboard. The gradual development of observational and experimental methods made possible the building up of a sketchy factual content. The invention of new methods and the extension and refinement of experimental techniques have been effective in rounding out this body of knowledge along systematic lines. Finally, animal psychology has adopted the objective viewpoint and thus discarded entirely the principle of anthropomorphic interpretation. Having settled these fundamental problems, it is now possible to lay out a comprehensive program of investigation as a guide to future developments. The broad outlines of such a program will be presented in the following section.

THE PROGRAM OF ANIMAL PSYCHOLOGY

The proper program of any science is to develop its field of possible knowledge along systematic lines. Such a program is best

indicated by a division of the field, from a broad perspective, into major and minor problems and lines of research. It is impossible, at the present time, to offer more than a tentative program for animal psychology because the science is still in the early formative stage. Nevertheless, this should be of some value in orienting the student with reference to the nature and scope of the field as now envisaged. Our first task will be to classify the types of behavior that are open to analysis and to point out the problems that fall naturally under each type. This will serve to indicate roughly the scope of possible knowledge relative to a given individual or a species. Our second task will be to compare and contrast the several major lines of approach which are now utilized in the analysis of behavior.

Classification of Behavior.—It has long been the tradition to divide animal activities into two main classes: native and acquired. The first class would include reflexes, tropisms, and instincts, whereas the latter would comprise habits or learned reactions. This two-way classification rests upon the old notion that a clear-cut dichotomy exists between hereditary and environmental factors in the field of behavior. This notion has now been discarded on the basis of extensive genetic studies in the animal field. The evidence shows that hereditary and environmental factors operate together throughout the whole course of development. They are interpenetrated, rather than independent, from the moment of fertilization onward. This means that all types of behavior are partly native and partly acquired. It is doubtless true that many of the early and simpler forms of behavior are dominantly hereditary, since they appear before environmental factors can play much of a role. However, the relative dominance of the two factors can hardly be demonstrated in connection with many types of complex behavior that appear later in the life cycle. In any case, a two-way classification is of little value in formulating the multitudinous kinds of reactions to be found in the animal world. It seems best, therefore, to offer a new and more elaborate classification that does not involve the native-acquired distinction. The question as to the genetic origins of each type of behavior will thus be left open, as it should be, for independent investigation.

Receptive and Reactive Capacities.—In the following outline, an attempt has been made to divide behavior into classes that correspond to fairly definite biopsychological functions. As will be noted, two main groups of activities are here recognized: (a) receptive capacities, and (b) reactive capacities. The one includes the sensory and perceptual processes, whereas the other comprises the behavioral reactions which occur in laboratory and habitat situations. The numerous sub-types, under each main division, follow roughly the natural lines of functional cleavage. For example, the categories under receptive capacities correspond to the sensory systems commonly found in living organisms. Moreover, the types of behavior, listed under reactive capacities, refer to important and fairly definite life activities. On the whole, the classification here offered is in agreement with the general program of research now followed in animal psychology.

General Classification of Behavior

I. *Receptive Capacities*

Chemoreception: taste, smell, common chemical sense

Thermoreception: temperature sense

Contact Reception: pressure sense

Phonoreception: hearing

Photoreception: vision

Electric Reception: sensitivity to electrical stimuli

Statoreception: equilibratory sense

Internal Reception: kinesthetic and organic senses

II. *Reactive Capacities*

Simple Movements: motor coordination, grasping, and locomotion—walking, swimming, flying, crawling, etc.

Feeding Behavior: activities associated with the securing and ingestion of food, water, etc.

Protective Behavior: autotomy-regeneration, avoiding and defense reactions, modes of attack, fighting, etc.

Reproductive Behavior: primary sexual activities, courtship, mating, care of the young, etc.

Special Types of Behavior: limited to certain animal types

Inactive States: hibernation, sleep, hypnosis, etc.

Sound Production and Communication, etc.

Group Behavior—Intraspecies: aggregation, migration, leadership, domestic and familial relationships, play, etc.

Group Behavior—Interspecies: parasitism, symbiosis, commensalism, biotic community life, etc.

Orienting Behavior: positive and negative orientation to various sorts of stimuli, homing, etc.

Temperament and Emotional Expression

Motivation Factors in Behavior: incentive-drive indices and the relative importance of these factors in typical life activities

Modifiability of Behavior: learning-retention indices showing range of capacity to form new patterns of adjustment

General Intelligence: general level of behavioral capacity based on an evaluation of all indices of receptive and reactive capacities

Problems Opened by the Classification.—As might be expected, the several types of behavior listed in the outline involve different problems calling for special methods of attack. A few examples may be cited in passing. In the analysis of each receptive capacity, the most common problems are as follows: (a) Range of sensitivity to effective stimuli, (b) discrimination limens, (c) importance of the modality in normal perceptual life. The organs of hearing and vision are often elaborate enough to suggest further analysis within these fields. Can an animal make use of pitch, timbre, and intensity cues as single dimensions? How accurately can a given species localize sounds in space? Is color vision present? How does brightness vision compare with size, form, and pattern discrimination? It should be clear that the problems of sensory analysis are much the same here as in the human field. Naturally the methods of testing are quite different and introspective reports cannot be obtained on the animal subjects. In the case of many of the reactive capacities, the chief problem is to secure an adequate knowledge of the animal's mode of life in its natural habitat. Such a descriptive background is necessary in order to arrange suitable laboratory conditions for measuring motivation, learning, and intelligence. Some of the problems and methods relating to these three experimental fields will be described and illustrated in the following chapter.

Major Lines of Approach.—Before dealing with specific methods, it seems desirable to discuss very briefly the three major

lines of approach which properly belong to the science. These are as follows: (a) Observation and experimentation, (b) genetic analysis, and (c) comparative synthesis. In actual practice, these several modes of investigation are not altogether distinct. There is considerable overlapping both in methodology and in content. In spite of this fact, essential differences are involved in so far as general perspective or mode of approach is concerned. Moreover, they are markedly divergent in aim and in breadth of scope. Each major line of approach fills an important place in the comprehensive program of animal psychology.

Observation and Experimentation.—Observation and experimentation play the dominant role here as in the other natural sciences. This general and basic line of approach must be utilized in all studies of animal behavior, since it is the only way to secure new concrete facts. Experimentation differs from observation mainly in the utilization of laboratory controls which insure greater specificity and accuracy of results. The stimulus is better defined, distractions of all sorts are excluded, and the response to the stimulus is more precise and definite. Such control is made possible by the use of dark rooms, soundproof rooms, automatic presentation of stimuli, apparatus limiting the freedom of the test animal, and numerous other laboratory devices. Moreover, specific problems can be set, which might never occur in nature, and these can be repeated until statistically dependable results are secured. Nevertheless, observational studies in the field are important and should always precede attempts at experimental analysis. Suitable living conditions in the laboratory and appropriate experimental settings presuppose a broad knowledge of the activities of the species in its natural habitat. Moreover, most of the reactive capacities listed in the outline above must be studied, in part at least, by systematic field work. This is particularly true of protective behavior, group behavior, reproductive behavior, homing, and the like. In the last analysis, observation and experimentation differ only in degree and tend to supplement each other in a well-rounded program of research.

The Genetic Approach.—Genetic analysis represents the developmental approach to the behavior of a given species. The interest here

is in the series of changes which occur in the behavior repertory of the type during the complete life cycle. This involves the timing of the initial appearance of each activity and a record of the variations which it undergoes through the periods of maturity and decline. In actual practice, genetic analysis in animals is seldom carried beyond adolescence, largely because early development is more interesting and convenient to study. It is here, indeed, that the best evidence concerning the relative dominance of hereditary and environmental factors is to be found. Nevertheless, a complete genetic study would cover the entire life cycle of the species. It is true, of course, that genetic analysis involves observation and, at times, simple experimentation. However, the problems and perspective differ essentially from the usual cross-section studies in which observation and experimentation are employed. In seeking to build up a generalized, life-cycle pattern of behavior for the species, genetic analysis must take into account such variant factors as strain, sex, and age differences.

The Comparative Approach.—Comparative synthesis represents the broad evolutionary approach to the behavior of the animal world as a whole. It is phylogenetic in scope and perspective, whereas genetic analysis is limited to ontogenetic problems. It involves the comparison as to behavioral level of species, genera, orders, classes, phyla, and other related groups. Such comparison may be limited to a few allied species or orders or it may be extended to the larger groupings, as the evidence at hand seems to warrant. It may be restricted to a single type of activity, such as vision, or be broadened to include the complete synthesis of behavior which we have termed "General Intelligence" in the outline of the preceding section. In brief, comparative synthesis takes into account all intergroup differences in behavioral capacities.

The central aim of the comparative approach is to trace the rise in behavioral complexity which has taken place as the structural complexity of animal types has increased from age to age. This would lead, in the end, to a broad synthesis covering the evolution of general intelligence from the simplest living organism to man, the highest of the Primate order. Such a synthesis would require a comprehensive

and intensive program of research on representative animal types at all levels of behavioral complexity. This suggests a task of such magnitude that it may well be regarded as the final, and perhaps ideal, goal of animal psychology. In any case, it must be admitted that up to the present little has been done toward the attainment of this end. Nevertheless, it should be realized that the facts and interpretations of animal psychology find their most interesting and meaningful place within the framework of a broad comparative synthesis.

The comparative approach presents certain fundamental difficulties that tend to hinder systematic advance. Perhaps the most important of these grows out of the wide diversity in structure and function that exists among animal types. Some notion of the scope of such divergence may be had by a cursory examination of the chapter, in a recent volume,¹⁰ on the comparative morphology and physiology of organisms. The differences here are most marked in connection with the reactive mechanisms on which all activities depend. For example, some animals crawl, some walk, some swim, while others fly. It is difficult, indeed, to plan an apparatus which can be used to test such variant types. It is obvious, however, that the same problem must be presented to the animal types to be compared, if legitimate conclusions are to be drawn regarding differences in behavioral level. The test situations must be equally fair to all. The development of standardized apparatus suitable for testing a reasonable variety of types will be necessary before genuine advance can be made by the comparative approach.

The Present Emphasis.—The main emphasis of psychologists up to the present has been on laboratory studies rather than field work. The reasons for this should be fairly apparent. In the first place, the primary impetus behind the present movement was the development of experimental methods. The feeling still prevails, in some quarters, that field studies are of second-rate importance, and may well be left to the naturalist. In the second place, the topics that yield best to laboratory study have seemed to be more definitely psychological and more closely allied to the human field. These topics are largely confined to the following three classes of behavior: (a) Receptive capacities, (b) motivation, and (c) learning and intelli-

gence. Most of the contributions relating to the other classes of activities, listed in the outline of the preceding section, have been made by biologists. There are some indications, however, that this narrow emphasis on laboratory work is beginning to give way to a broader systematic outlook. This is suggested by an increase in the number of comprehensive and extremely valuable field studies on primates and other animal types.

A further narrowing influence has been the continued emphasis in research on the behavior of the higher vertebrates—birds and mammals. This is due, no doubt, to the widespread feeling that the greatest contribution can be made to human psychology by work on these groups. In any case, the study of the activities of the invertebrates and the lower vertebrates has been left, very largely, to biologists with a special interest in the problems of behavior. So far as present indications go this situation seems likely to continue into the indefinite future. Another trend in emphasis is represented by the extensive interest in the learning process, as exhibited by the white rat in various test situations. A large part of the present laboratory output is concerned with some phase of this general problem. The aim here is to analyze the learning process in detail in the hope of developing a general theory applying to all organisms. It seems logical to believe, however, that the study of such higher mammals as dogs, cats, raccoons, monkeys, and apes would throw more light on the nature of the learning process in man. There is some reason to believe that this undue emphasis on the behavior of the rat is now being corrected by the recent emphasis upon primate research.

These several trends have determined, in an important way, the selection of methods and results to be presented in the chapter that follows, for our interest there will be to illustrate the more advanced developments in the field to date. This means that we shall limit the brief survey to the three topics, mentioned above, on which laboratory work has been largely concentrated. In like manner, the treatment will be restricted to the higher animals since the most refined methods have been devised for these types. Furthermore, the white rat will be given greater prominence than it properly deserves, because it has been tested so much more extensively than any other types in the animal laboratory.

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CHAPTER III

ANIMAL PSYCHOLOGY (METHODS AND RESULTS) *

By C. J. WARDEN, *Columbia University*

INTRODUCTION

As indicated in the preceding chapter, this brief survey will be limited in scope to the following three topics: (1) receptive capacities, (2) motivation, and (3) learning and intelligence. As a matter of fact, most of the laboratory studies that have been made, up to the present, fall within these fields. This is partly because the problems here are likely to be definite and open to ready experimental analysis. Moreover, these three fields correspond rather closely to certain major topics in human psychology, and this gives them special interest and significance. The student may refer to more comprehensive surveys of animal psychology¹ for a treatment of such other types of behavior as we have listed in the outline of the preceding chapter.

It will be impossible, in the brief space permitted, to cover even sketchily the three topics mentioned above for the animal kingdom as a whole. It seems desirable, therefore, to restrict the treatment to the methods and results relating to the behavior of the vertebrates. Even as thus limited, only a few of the better standardized methods in each field can be described and illustrated. The samples of apparatus included will be those adapted for testing the more common laboratory animals. Our primary aim will be merely to illustrate the kinds of methods and results which characterize these three major fields of investigation.

RECEPTIVE CAPACITIES

The primary aim of sensory analysis is to determine the role of taste, smell, hearing, vision, and other modes of reception in the

* Thanks are due to the Ronald Press for permission to copy the ten figures used in this chapter from Warden, Jenkins, and Warner, *Comparative Psychology*, Volumes 1 and 3.

life-activities of animal types. This end is best attained by securing precise indices in the laboratory of the receptive functions which can be checked later against the complex behavior of the natural habitat. Until this has been done, it is hardly possible to set up appropriate problems in the fields of motivation, learning, and intelligence, for such problems must be arranged to harmonize with the sensory contacts of the particular species. For example, most birds possess little or no sense of smell, hence it would be absurd to set a task for them which required the use of this function. Such a task would be proper enough for dogs since they possess a very keen sense of smell. It is clear, therefore, that sensory analysis should precede experimentation on the more complex forms of behavior. Before passing to the treatment of the concrete methods of testing the receptive capacities, it will be advisable to discuss certain concepts and principles that possess general significance for this field. As we shall see, the methodology utilized in measuring discrimination ability in animals differs in several important respects from that commonly employed in the human field.

Principles of Analysis.—An objective criterion of discrimination has long since been adopted for use in animal work. This became necessary when it was realized that any “sensations” which may arise from stimulating animals are beyond human knowledge. Moreover, verbal report is impossible in as much as there is no common language for communication between man and animal. The objective criterion which has been adopted is the well-known principle of differential response. If an animal does react positively to one stimulus cue of a setting and negatively to all other cues of the setting, we say that it is making a discrimination. Of course, this selective response must occur consistently and under conditions which insure that the decisive factor is the specific cue supplied by the positive stimulus. It is obvious, for example, that an animal can distinguish between white and black if it is able to respond to the white card of a white-black pair regularly, provided care is taken to equalize all stimulus dimensions in the setting except brightness. The same principle would apply when pairs of stimuli from any of the other sensory modalities are presented to the animal. In most instances,

both stimuli of the pair are presented simultaneously in the test, although this need not be the case. It should be pointed out that the principle of differential response is sometimes used in the human field. In testing for color blindness, for example, the subject may be asked to sort out yarns according to their colors instead of making a verbal report by naming the colors. However, in most human discrimination studies the method of verbal report is used because it is more convenient and less time-consuming.

Requirements of a Test of Discrimination.—Although the differential response principle is simple enough, it is often very difficult to apply it in concrete test situations. This is especially true in connection with the determination of limens or other precise measures to be used in the comparison of different species. These difficulties center around the three basic requirements of the discrimination experiment: (1) Sufficiently specific stimulus conditions, (2) optimum motivation of the animal during the testing period, and (3) the use of a suitable response to serve as the indicator of discrimination. These several major aspects of the testing set-up will now be briefly discussed in order. The student may refer to a recent volume² for a more comprehensive treatment of the methodological principles involved.

(1) *Rigid Control of Stimuli.*—It is obvious that, unless the stimulus conditions are definite, it will be impossible to specify the nature of any discrimination habit established by the test procedure. The first step here is to provide for use qualitatively pure stimuli of known intensity value from which proper selections may be made. The latest methods of producing and calibrating stimuli for the several sensory domains are fully described in suitable handbooks on physics and physiology. The next step is to select stimuli for the test which are equal in all dimensions except the one that is to be systematically varied for study. Then pairs of such stimuli are presented to the animal under an appropriate training routine. If the animal possesses the ability to make the required discrimination, a differential response should be set up after a sufficient amount of training.

In some instances, it is impossible to secure pairs of stimuli that are equated in all but a single dimension. This is notably true in connection with tests for color vision and pitch discrimination. The difficulty here arises from the fact that the eye and ear do not respond to the physical intensity of stimuli after the manner of a physical instrument. To equate the stimuli in physical intensity is, therefore, to leave them unequal in sensory value to the animal. Moreover, the sensory values vary considerably from species to species. The general procedure that must be followed in such cases may be illustrated by that used in the color vision test. Let us suppose, for example, that the positive stimulus is red and the negative stimulus is green. We select monochromatic bands from the spectrum, so that the stimuli are pure as to the wave-length factor, but they vary in intensity and hence in brightness value to the animal. For the moment we ignore the latter variant and establish a differential response to the pair of stimuli. It might very well be, however, that the habit rested on the brightness rather than the color cue, since the two stimuli differ in both dimensions. A control test is then run to rule out the use of the brightness cue. This is done by varying the intensity of the stimuli through a wide range, while keeping the wave-length factor constant. Since the brightness factor is eventually reversed in the two stimuli, the differential response will break down unless the animal makes use of the color cues present. If the discrimination habit remains stable, under such conditions, color vision is clearly indicated provided the experiment has been carefully done. This method of training to a two-dimensional set of stimuli and then ruling out one dimension later by control tests is to be used only when a pair of stimuli cannot be equated sufficiently by physical means.

Furthermore, it is also necessary to eliminate possible secondary cues from all the other stimulus domains in order to specify the nature of a discrimination accurately. As a rule, such secondary cues are excluded by making the tests in a dark, soundproof room in which the temperature is kept constant. The odors which arise from the presence of the food-incentive are rendered ineffective as cues by diffusing the room with the food-odor, unless the sense of smell itself is being investigated. As a further precaution, a one-way light screen

is usually placed between the test set-up and the experimenter in order to eliminate possible directive cues from the latter. In some cases, one or more of the sensory fields may be excluded by cutting the nerve which supplies the sense organ or by removing the latter entirely. Thus the auditory and optic nerves might be cut in order to isolate better the sense of smell for testing, and this would make unnecessary the use of a dark, soundproof room. Perhaps the chief advantage of the operative method of control is that exclusion is absolute provided the surgery has been properly done. However, unless the operation is very simple there is always the danger that it may lower the general level of reactivity of the animal. This in turn may tend to decrease the discrimination ability of the animal, under the test conditions, in the sensory systems that remain. In most instances, this difficulty is solved by allowing a long post-operational recovery period before making the tests. In any case, some method of control—either normal or operational—must be used to eliminate secondary cues from the other modalities, if a specific discrimination habit is to be established.

(2) *Optimum Motivation Must Be Provided.*—When suitable stimulus conditions have been arranged, the experimenter turns to the problem of providing optimum motivation to activate the animal during the test. It is now well established that most animals set up a differential response most readily when both reward and punishment are used. It is common, therefore, to give the animal a bit of choice food when it responds to the positive stimulus and to give it an electric shock, or other punishment, when it makes an error. The food-incentive varies in kind from species to species and the degree of shock to be used varies with the type of animal, its body weight, the difficulty of the discrimination that is required, and numerous other factors. The set of optimum food and shock conditions must be determined, therefore, by preliminary tests before the regular training is begun. Such conditions insure us that the animal is stimulated to do its best during the tests. Clearly this is an important consideration, especially if the experimenter is seeking to determine limens representing the limits of the capacity to discriminate for a given species.

(3) *A Suitable Response Indicator.*—There remains the problem of selecting the most suitable response to require of the animal as the objective evidence of discrimination. The aim here is to adopt a response that has no natural connection with the stimuli to be employed, and thus force the animal to make the necessary connection under the training routine. This may seem somewhat arbitrary, but only such a learned reaction can be regarded as definite and dependable. On the other hand, the indicator response should be simple in itself and easy for the animal to connect with the stimuli as presented. There are two general types of responses commonly utilized in refined laboratory work. These are associated with the two main types of discrimination test—the Discrimination-Response method and the Conditioned-Reflex method. In the first method, the animal is required to turn toward the side of the positive stimulus, pull in the positive stimulus by a cord, or reach for food concealed beneath the positive stimulus. The specific response varies with the locomotor and manual capacities of the species. In the second method, the activity of the salivary glands, or some simple motor reflex is utilized. As we shall see, these two methods differ also in certain other important respects.

Description of Methods.—A brief description of some of the apparatus and procedures employed in sensory analysis will serve to make concrete the principles set forth above. Our purpose will be merely to demonstrate the application of the two main laboratory methods — Discrimination-Response and Conditioned-Reflex — to specific problems. The apparatus here shown is limited to a single modality and to a narrow range of species. For information concerning the extension of these methods to other modalities and to other animal types, the student may consult the more comprehensive treatment of the author.³ As a matter of fact, the basic principles of sensory analysis are much the same for the field as a whole.

The Discrimination-Response Method.—The apparatus shown in Fig. 1 for testing vision in birds and small mammals will serve to illustrate the Discrimination-Response method. The stimuli (S, S_1) in the front of the box are used in testing form discrimina-

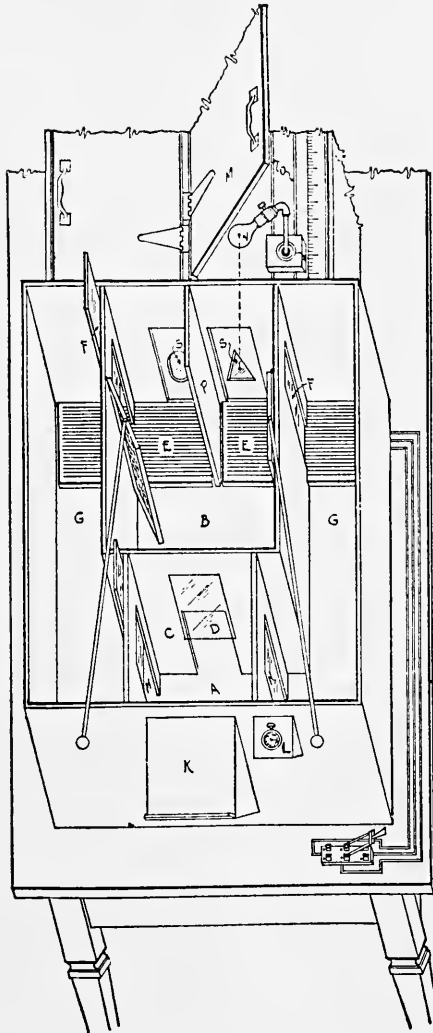


FIG. 1.—YERKES-WATSON VISION APPARATUS (BRIGHTNESS, SIZE, FORM).

A, entrance box; *B*, reaction compartment; *E*, *E*, electric grids; *S*, *S*, stimuli; *G*, *G*, passages to food and to entrance box; *N*, light in dark box which illuminates the stimulus, the door *M* being closed during the test. The two dark boxes are similarly equipped and are about 6 feet long. Experimenter stands in front of apparatus, hidden from animal by one-way light screen (not shown), operates switch for applying shock to either grid, and records performance at *K*. The stimuli shown are for testing form discrimination and can be shifted from side to side by a sliding device (not shown). (From Warden, Jenkins, and Warner, "Comparative Psychology," Vol. I, by permission of The Ronald Press Company.)

tion, the circle and triangle being equal in area and differing only in shape. Pairs of stimuli for testing size and brightness discrimination may readily be substituted for those shown in the diagram. Size stimuli are usually selected from a closely graded series of circles, the largest one of the series (6 cm. in diameter) being taken as the positive stimulus. The limen for size discrimination can be determined by gradually increasing the diameter of the negative stimulus until the habit established earlier for larger size differences breaks down. In testing brightness discrimination, two circles of the same size are used. Differences in brightness between the two circles are regulated by placing the lights, in the long boxes (6 ft.) behind, close to one stimulus and far away from the other. After the brightness habit has been established, the limen can be determined by decreasing the difference in illumination until the break-down point is reached. In all work of this sort, the right-left positions of the two stimuli must be shifted in an irregular order to prevent the animal from forming a mere right-turn or left-turn habit. Numerous other details covering the control of stimulus factors will be found in the general reference cited above.

The procedure of testing is itself fairly simple, provided the animal is docile and the experimenter is patient and careful. The animal is brought into the dark, soundproof room and placed in the entrance compartment. After a moment, it is released by raising the door (D) and then, after observing the stimuli, it moves forward toward one of them and the door operated by the rod is closed behind it. If the response is correct, the animal finds food in a dish at G; if it is an error it is given a properly graded shock on the grid at E. In order to equalize odor cues, a dish of food is also placed at G on the "error" side, but here it is covered by a screen to prevent the animal from taking it. The experimenter stands in front of the apparatus, hidden from the reacting animal by a one-way light screen which is not shown in the drawing. This apparatus is commonly used for testing chicks, doves, white rats, guinea pigs, kittens, and other small animals. The same stimulus section may be used in testing brightness, size, and form in any animal, including man, by supplying a reaction section suitable to these several types of organisms.

The Conditioned-Reflex Method.—The Conditioned-Reflex method as utilized by Pavlov in testing tactual discrimination in the dog is shown in Fig. 2. The same general procedure is employed in testing vision, hearing, and other sensory domains. The stimuli are presented to the animal by automatic devices operated by the experimenter in the adjacent room. As a rule, the salivary reflex is used as the indicator response, although simple motor reflexes have been utilized on occasion. As will be noted, the flow of saliva is automatically measured and registered. The first step in applying this

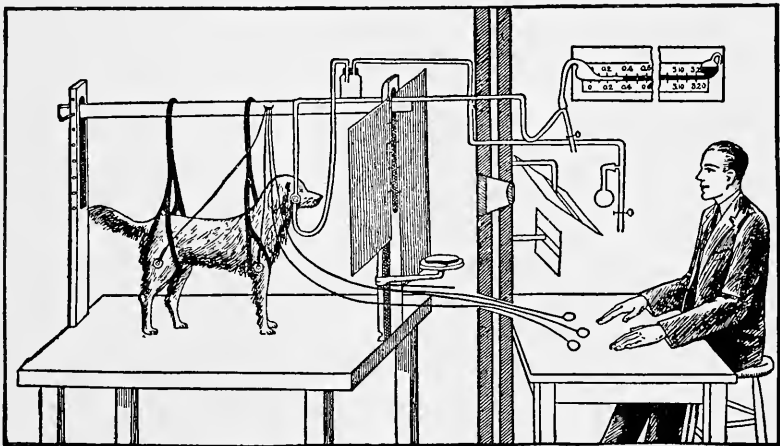


FIG. 2.—CONDITIONED REFLEX METHOD (PAVLOV'S NEW LABORATORY).

Pneumatic devices are used in applying tactual stimuli and the amount of the salivary flow is automatically measured. (From Pavlov, "Lectures on Conditioned Reflexes," by permission of International Publishers.)

method is to set up a conditioned response to the positive stimulus. This is done by associating it with the flow of saliva by giving a series of double-stimulations (stimulus-food). After this has been well established, the so-called method of contrast, involving the negative stimulus and punishment, is introduced in order to secure limens. For example, the dog in Fig. 2 is being positively conditioned to contact stimuli at a point on the right hip. Later on, tactile stimuli-shock combinations, which induce inhibition, will be applied to nearby points on the same member. By moving the negative stimulus gradually closer to the locus of the positive stimulus, the two-point threshold

for touch can be determined—at the point where the inhibition breaks down. Frequent reinforcement of the positive response by giving stimulus-food combinations is usually necessary during the contrast series, in order to insure the stability of this reaction. As will be seen, this general method differs from the one described above in the following important ways: (1) The positive and negative stimuli are presented in successive series rather than simultaneously, and (2) the indicator response is somewhat simpler than the turning or reaching reactions required in connection with the Discrimination-Response method.

Results on the Vertebrates.—The task of systematic sensory analysis has not been carried far as yet in the animal field as a whole. A survey of the results to date, in each of the major domains, may be found under appropriate topics in available textbooks.⁴ The most that can be done, in the present brief summary, is to note a few of the main trends relating to the evolution of sensory capacities in the vertebrates. It will be necessary, moreover, to limit the treatment to the three most important types of distance reception—smell, hearing, and vision. As a matter of fact, these three modalities provide the key to the evolution of sensory capacities in the vertebrates. The elaboration of the distance receptors, paralleled by structural changes in the brain, go hand in hand with an increase in complexity of sensory and behavioral life. A general interpretation of results, rather than a detailed citation of specific findings, will now be offered within the limitations indicated above. In most instances, the conclusions drawn are based upon scores of experimental studies.

The Sense of Smell.—The sense of smell is highly developed in the fishes and, in most types at least, it is the dominant modality utilized in food-searching and numerous other activities. The same is true of the amphibians during the early or aquatic stage of the life cycle. In the adult or terrestrial stage, however, such amphibians as frogs and toads show a reduction in olfactory acuity associated with an advance in the use of vision. A similar distinction seems to hold between the aquatic and the terrestrial reptiles. The primitive birds, like their reptilian ancestors, possessed a fair degree of ol-

factory acuity. This was lost, for the most part, in the evolution of the beak and the parallel elaboration of complex visual functions. The olfactory capacity is entirely absent in most of the higher, modern birds. The mammals, like their reptilian ancestors, possess at least a fair degree of olfactory acuity. There is reason to believe, moreover, that a further evolution of this sense occurred among many of the ground-living types. This is known to be true in the case of such carnivorous forms as the dogs and their allies. The ability of dogs to trail and to identify objects by odor cues is far superior to that of man or of mammals and vertebrates in general. This fact has been confirmed by a large body of experimental evidence. It seems likely, moreover, that smell is the dominant type of distance reception in most, if not all, of the ground-living mammals.

The Sense of Hearing.—Hearing is poorly developed in fishes and is entirely absent in all but the higher orders. The key to the evolution of hearing in the vertebrates is the lagena, or primitive cochlea, which gradually evolved from the labyrinth or equilibratory organ. The lagena first appears among the higher fishes and, at this stage of development, is sensitive only to a low range of pitch. The range for the goldfish, which is the longest reported to date, is 43 to 2,752 d.v. The comparable range for man is 16 to 20,000 d.v. Among the amphibians, the salamanders appear to lack the auditory sense entirely. Frogs and probably toads, on the other hand, appear to be able to hear sounds up to about 10,000 d.v. Hearing among the reptiles varies considerably from order to order. Some of the lizards can hear up to 12,500 d.v. The auditory sense seems to be lacking in turtles and in the common snakes, including the rattler. Crocodiles and alligators possess hearing, but the possible range here has not been determined. The range of hearing in birds, where a true cochlea first appears, seems to be about the same as in the lizard. The sense of hearing is well developed in all classes of mammals. Strangely enough, the auditory range is greater in some of the common mammals than in such primates as the monkey, chimpanzee, and man. Also some of them are much more sensitive to sounds of low intensity than are the primates. This is true, for example, of the guinea pig and the dog. It is only fair to say that the above conclu-

sions, relating to the presence or absence of hearing in groups, is based on a sampling of the species of each order. The same is true of the group ranges indicated. In either case, it is possible that tests on other species might give very different results. Nevertheless, the positive indices as reported may be accepted with complete confidence.

The Sense of Sight.—Vision is an extremely complex sensory function, involving such distinct dimensions as brightness, size, form, pattern, and color. In a broad sense, color vision may be taken as the key to evolutionary advance in all of these visual fields. This is true because color vision presupposes a retina well enough developed to support a relatively high degree of efficiency in these non-chromatic dimensions. It will be sufficient, therefore, to indicate merely the evolution of color vision in the vertebrates. Apparently a few of the fresh-water fishes possess limited color vision but make little use of it in ordinary life activities. This function is much more definite and important in amphibians and reptiles. It is tetrachromatic as in man and, in some turtles at least, extends over the same spectral range as in man. The work on birds seems to indicate that many of them can distinguish approximately as many different colors as we can. The same is probably true as well for such mammalian types as the monkeys and the great apes. There is clear evidence, however, that most ground-living mammals are color blind. This has been demonstrated on the rat, rabbit, cat, dog, cow, etc. It has also been shown that it is the movement of the cape, and not its color, that excites the bull in the fighting arena. These facts support the evidence from other sources which shows that vision is of secondary importance in the life activities of all the mammals except the tree-living primates and man, who evolved from arboreal stock.

Some General Conclusions.—A number of conclusions of general significance may be drawn from the survey of trends presented above. In the first place, it is obvious that man is not the superior animal in every respect. His sense of smell is probably not above that of the average vertebrate and is far below that of the dog. His hearing is superior to that of most vertebrates, but here again his range is below that of the dog. His visual powers are much better developed than those of most vertebrates, but probably no better than those of

his primate cousins. Another important conclusion is that superiority in one sensory field is likely to be associated with inferiority in some other. Dominance of smell, for example, goes along with poor vision with fair consistency. It is interesting to note, moreover, that the two most important types of distance reception—hearing and complex vision—were the latest to evolve in the vertebrate series. Finally, if space permitted, it would be easy to show that the relative dominance of these several sensory systems exhibits a close correlation with habitat and life activities.

MOTIVATION

Animal Drives.—An animal is a “going concern” and not a mere passive machine for the reception of stimuli from its environment. It possesses a specific internal organization, which is evolutionary and hereditary, and which follows a fairly definite species pattern. This explains, in part at least, why a dog, a cat, and an elephant respond differently to the same stimulus. The primary function of stimuli is merely to set off the internal mechanisms or systems of the animal. It is the latter which largely determine the pattern of activity which follows. They represent the inner springs of action—the innate and persistent cores of all behavior. They are definitely related, in most cases at least, to important biological needs and wants. These dynamic components of behavior have long been called instincts, but the more modern term is drives. Each of the primary drives, such as hunger, thirst, sex, and the like, can be normally satisfied by an appropriate incentive, or class of incentives. The purpose of analysis in this field is to measure the strength and persistence of the several drives which characterize various species. The indices thus obtained afford a basis for the objective interpretation of the fundamental needs and wants of the animal world.

The Isolation of Drives Is Difficult.—The work on animal motivation is much more limited in scope than is true of either of the other two fields under review. This is due to the fact that, until fairly recently, suitable methods for the study of drives had not been devised. The task of analysis is especially difficult here because the various drives are likely to be closely interrelated. In many cases, it

is almost impossible to isolate them one at a time for measurement. Moreover, an adequate study of motivation presupposes a good background of knowledge regarding the behavioral potential of the type to be tested. These facts probably explain why the work in this field has been so largely limited to the white rat. A description of the methods that have been developed for testing motivation will be found in a recent textbook.⁵ The Columbia Obstruction method will be emphasized in the present treatment because it is especially well standardized and offers considerable promise for future systematic work. The results obtained in an extensive project on the white rat, by the use of this method, will be supplemented by other findings of importance in this field.

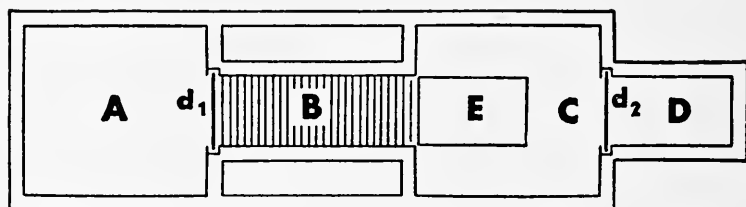


FIG. 3.—COLUMBIA OBSTRUCTION APPARATUS (GROUND PLAN).

A, entrance compartment; *B*, obstruction compartment with electric grid; *C*, incentive compartment; *D*, position of incentive; *E*, release plate; *d*₁, manually operated door of entrance compartment; *d*₂, automatic door operated by release plate. (Reproduced from Warden, "Animal Motivation," by permission of Columbia University Press.)

The Columbia Obstruction Method.—The ground plan of the Columbia Obstruction Apparatus is illustrated in Fig. 3. It consists essentially of an entrance compartment, an electric grid section, and an incentive compartment, with a small box attached to hold the actual incentive. When the aroused animal is in the entrance compartment, the electrified grid serves as an obstruction to the securing of food in the incentive compartment on the other side. Of course, the degree of shock used must be properly graded to suit the type and size of the animal being tested. The best plan here is to use a medium or optimum shock—one that will cause the animal to hesitate without inducing refusal to cross altogether. This hesitation will be less for a strong drive than for a weak one. Naturally, this will be

true only if the degree of shock utilized is the same for each of the drives to be measured and compared. The general principle here is the same as that which underlies the human intelligence test—individuals and drives become directly comparable in terms of performance scores on an identical task. The apparatus itself is of small value, however, unless the procedure of testing is kept the same from drive to drive. Moreover, numerous controls are necessary in order to isolate a given drive and to arouse it to maximum strength for measurement.

Perhaps the best way to explain the method will be to describe, as briefly as possible, its use in the Columbia University laboratory in connection with a comprehensive project on the white rat. The broader aim of this project was to analyze the basic drive-complex of this typical rodent. The following drives were selected for investigation: (1) Hunger—male and female, (2) thirst—male and female, (3) sex—male and female, (4) maternal, and (5) exploratory. As will be seen, these are all dynamic functions which serve basic biological needs and wants. The first step was to secure mature animals of the same strain, age, and past experience. These conditions are fulfilled by the Wistar Institute rats, a closely inbred strain, and these were supplied to us at the same age (185 days) as required, over a period of years. The white rat becomes sexually mature at about sixty days, hence these animals were young adults in which the drives to be tested were fully developed.

The next step was to devise a means of arousing each drive in definite degrees, ranging from the zero point to well beyond the maximum point, so that each of these levels could be measured. The plan adopted for hunger will serve as an illustration of the way this can be done. The zero hunger group was tested without being deprived of food in their living cages at all. Other groups were tested after 2, 3, 4, 6, and 8 days of food deprivation, hence the tests were carried well beyond the maximum point. In much the same way, the maximum score was determined for thirst and for the male sex drive. The female sex drive is dependent upon the oestrus cycle, which recurs at about four-day intervals, and which is associated with marked cellular changes in the organs of reproduction. The maxi-

imum point here was determined by testing the female when in oestrus proper, as indicated by the histological picture of vaginal smears. The maternal drive was tested a few hours after the mother rat had given birth to a litter. The tendency to explore within a network of runways attached to compartment C was measured after confining the animals in small living cages. In order to cover all these conditions adequately, more than 500 animals had to be used.

Another important step was to arrange a set of standard conditions for keeping four drives quiescent whenever the other one was aroused for testing. The plan adopted here may be illustrated by noting the series of controls employed when the sex drive was to be measured. Hunger and thirst were allayed by allowing the animal access to food and water in the living cage up to the moment of the test; the maternal drive was eliminated by using only males and non-pregnant females; the exploratory drive was kept quiescent by allowing the animals to be normally active in their cages up to the time of the test. Further details concerning these controls will be found in the volume ⁶ covering this project as a whole.

Before the regular test began, the animal was permitted to cross to the incentive four times without shock and then once with shock. This procedure permitted it to be aroused by the incentive and to locate the position of the shock. During the test proper, which followed immediately, the animal was allowed to cross the grid with shock as often as it would within the 20 minute test period. It was, of course, replaced in the entrance compartment immediately after each crossing. The incentives employed were equally appropriate for the several drives, and the degree of shock and the length of the test period were the same throughout. The conclusion seems to be warranted, therefore, that the greater the number of crossings the stronger the drive. If this be true, then the scores obtained for the maximum strength of each drive may be taken as the general index of the particular dynamic function. On this basis, the several drives of the white rat could then be rated as to relative strength.

Some Typical Results.—The results of this investigation are shown in the graph of Fig. 4. When the maximum scores are compared, the drives fall into the following rank order: (1) Maternal,

(2) thirst, (3) hunger, (4) sex, and (5) exploratory. In a control group in which no incentive was used, the number of crossings was only 3.5 per animal. The maternal drive was even stronger than is indicated in the graph for young females having their first litter, the score for this group being 28.33 crossings. As will be seen the sex drive for the two sexes is about equal in strength. The same is true of hunger and thirst, hence the scores for both sexes were combined in drawing the curves shown in the diagram. As may be seen, there

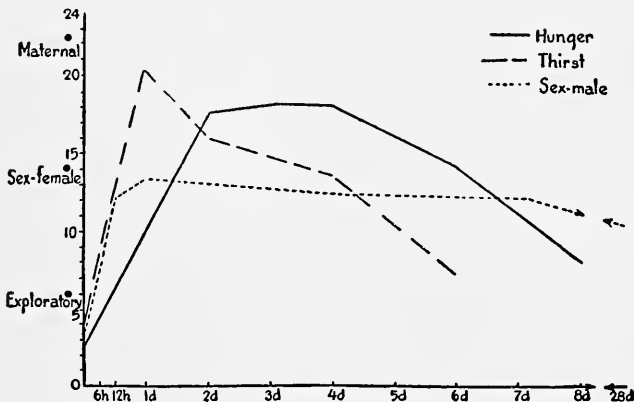


FIG. 4.—ANALYSIS OF DRIVES IN THE WHITE RAT.

Strength of drive, in terms of the number of crossings of the grid, is shown in the ordinate. The periods of deprivation for hunger, thirst, and sex (male) are indicated on the abscissa. The hunger and thirst scores for males and females are combined. (Reproduced from Warden, "Animal Motivation," by permission of Columbia University Press.)

is a greater difference between some of the drives than between others. The maternal drive is clearly the highest and the exploratory drive the lowest. Also both thirst and hunger appear to be definitely higher than sex. It has been shown elsewhere⁷ that the rank order cited above is statistically reliable when computed by the method of combining averages, which stresses the ordinal factor in the results as a whole. It is impossible to say, however, whether or not this order would hold for mammals in general without further work on other representative types.

The Obstruction method has been successfully employed in testing disturbed as well as normal drives. In one case, the hunger drive

was disturbed by requiring the animal to wait in compartment C, after crossing the grid, before getting the food. It was found that a delay, even as short as 15 seconds, weakened the drive, the number of crossings in the test period being decreased about 43 per cent. In another instance, the males and females were reared apart to see if this would disturb the normal development of the sex drive. This was found to be the case when the sexes were segregated before the onset of puberty, since they crossed more often than to one of their own sex than to one of the opposite sex. In still another case, the sex drive was eliminated by gonadectomy, in prepubertal animals, and then restored temporarily by injections of the appropriate sex hormone into them as adults. These and other drive disturbances were consistently reflected in the crossings score, when comparisons were made with the records of normal animals. The student may refer to the relevant sections of the author's *Animal Motivation* for a full account of these several studies of drive disturbances in the white rat.

The General-Activity Method.—Important contributions to the analysis of the physiological mechanisms underlying animal drives have been made by means of the General-Activity method. A review of the various types of apparatus employed, and of the results to date, will be found in a recent article by Richter.⁸ The primary aim here is to record by automatic devices the spontaneous activity of the animal under different drive conditions. It has been demonstrated, for example, that the hunger drive is due to the rhythmic contractions of the stomach. These contractions, which arouse and activate the animal, differ greatly in periodicity and strength from species to species, and are doubtless related to natural feeding requirements. It has also been demonstrated that the sex drive is due to the gonadal hormones. The activity record is very markedly lowered in both male and female rats by the removal of the gonads. The activity of the female also drops during the sexually inactive period known as dioestrus. It seems likely, moreover, that this general method of analysis should throw considerable light upon the physiological mechanism underlying the maternal drive.

Animal Drives in Man.—The study of animal motivation should make a genuine contribution to human psychology when it has been broadened in scope to include the primates. The primary drives are as deep-seated in man as they are in infrahuman organisms and play an important role in the dynamics of behavior. It is true that these drives are well overlaid by cultural factors, especially in the human adult, but even culture itself must rest upon biological needs and wants. Some of the facts already discovered by the work on the mammals can be carried over to the human field. For example, it is now known that the feeling of hunger arises from periodic stomach contractions, not unlike those of the white rat. The sex and maternal impulses in man obviously rest upon the same general types of mechanism as those found in the mammals generally. Nothing is more certain than that the basic biosocial complex of human nature evolved from that of the anthropoid level. Doubtless the study of the primary drives in the higher animals and man will enable us to understand better the relationship of culture to this fundamental biological heritage.

LEARNING AND INTELLIGENCE

The problems commonly included under this general heading have held a special interest for the animal psychologist from the very beginning of the experimental movement. This emphasis has extended down to the present, as would be indicated by a topical analysis of the research output of our laboratories. In the strict sense, learning and intelligence represent fairly distinct lines of investigation. Each field has its own particular problems and its own methods and procedures. It seems desirable, therefore, to treat the topics separately. The distinction between the two fields will become clear as we proceed with the description of concrete methods and results.

The Learning Process.—A vast array of studies dealing with the nature of the learning-retention process fall within this general field of research. By far the larger portion of the work has been done on the white rat by means of simple mazes and problem boxes. The primary interest here is not in the behavior of this species, but in an analysis of the learning process itself. The rat is used by the

psychologist to study learning just as the frog is used by the physiologist to determine the essential nature of reflex action. As we shall see, there is hardly a problem in the field of human learning that has not been tried out on the white rat. In general it has been found that the conditions that make for efficient learning are much the same in rat and man. This suggests the possibility of generalizing such basic factors in learning to all living organisms. It will be desirable, at this point, to illustrate the two methods commonly employed in this major field of investigation.

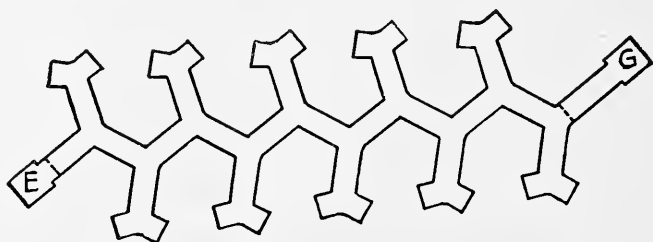


FIG. 5.—WARNER-WARDEN MAZE (LINEAR PATTERN).

This shows a 10 cul-de-sac linear pattern of the unit maze suitable for the analysis of serial learning problems. The pathway is tortuous and at the same time symmetrical. (From Warden, in "J. Genet. Psychol.", by permission of The Journal Press.)

Maze Learning.—The maze method has been chiefly utilized in this work. Many types of mazes have been devised,⁹ but only a few of these are widely used at present.¹⁰ The pattern shown in Fig. 5 is linear in design and hence is especially well suited for the study of serial learning tasks. As will be seen, it consists of a central pathway connecting the entrance box (E) with the goal box (G) and a number of blind alleys, or culs-de-sac. The maze habit is a behavior pattern corresponding to the true pathway, or the shortest distance to the food at the goal end. At first the animal enters the blind alleys along the pathway, but such errors are gradually eliminated as learning proceeds. The scores usually obtained are the number of errors per trial, and the time per trial as taken by means of a stop watch. The order in which the several blinds are eliminated may be determined by numbering them and checking the specific errors from trial to trial. The rate of progress in the formation of the maze habit can be shown graphically by plotting learning curves, based on error or

time scores. The degree of permanency, or retention, of such a habit may be tested by having the animals relearn the maze after a few weeks or months, during which no further practice is allowed. Maze learning is commonly regarded as motor habit formation, similar in many respects to the development of motor skills in man. An analysis of the work on the white rat has been found to throw considerable light upon the process of trial and error learning in general.

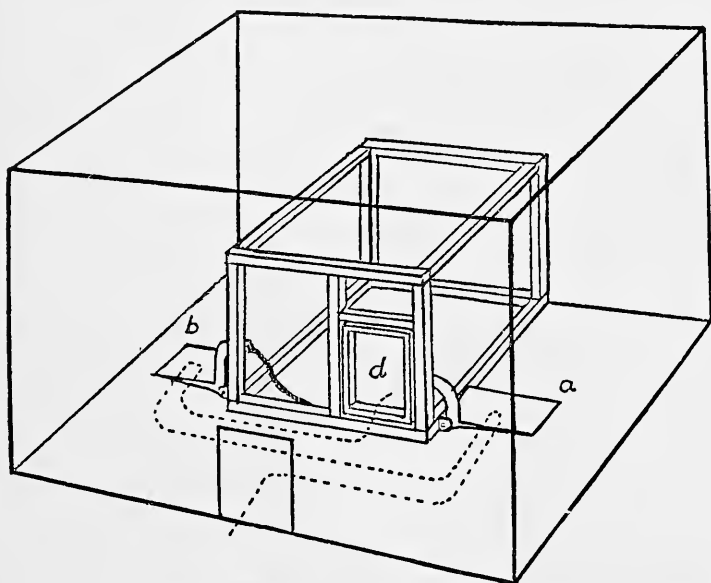


FIG. 6.—LASHLEY DOUBLE-PLATFORM APPARATUS FOR WHITE RATS.

The platforms *a*, *b*, must be pressed down in the order *a-b* in order to release the door, *d*, which opens inward by pressure of a spring. The weight required to depress platforms is regulated by adjustable springs underneath. The outer cage, made of wire mesh, is intended to limit the range of activity during the test. (From Lashly, "Psychobiology," by permission of The Williams and Wilkins Company.)

The Problem Method.—The problem method is also suitable for use in this field of investigation. An illustration of one of the better standardized problem boxes for the white rat is shown in Fig. 6. The animal must learn to press down the two platforms, in a set order, before the food in the inner cage becomes available. This requires some measure of ingenuity as well as skill in nose or foot manipulation. In fact, a problem apparatus differs from a maze

primarily in that the animal must operate a puzzle device instead of merely running directly to a place (goal box). Performance is scored in terms of time per trial and the number and kind of useless movements which occur. The time scores are usually used in plotting learning curves, since a speedy response is likely to mean that useless movements have been dropped out. The retention of a problem-box habit can be measured in the same manner as has been indicated above for the maze.

Learning in the Rat and in Man.—An excellent survey of maze and problem-box studies on the white rat will be found in a recent volume by Munn.¹¹ The most that can be done here is to call attention to some of the major classes of problems on which research work has been done. In the first place, it has been found that individual, age, and strain differences in learning capacity are large in the rat as they are in man. Moreover, curves of learning and of retention are similar in general, in both species, when based upon corresponding types of tasks. The influence of reward and punishment on the learning process shows a similar trend in rat and man, when both are tested on motor tasks of the maze type. The same is true of such factors as primacy and recency, whole-part methods of attack, massed versus spaced practice, transfer of training, and the like. In brief, the major conditions that favor efficient learning in man operate in the same direction in the rat. The wealth of experimental evidence, therefore, goes to show that the fundamental laws of learning apply with equal force to man and animals. Naturally this conclusion must be restricted to such types of learning as are common to both fields.

Other Uses of Learning Experiments.—The research on animal learning often goes far beyond the point of a mere check-up on the results secured in human work. This is especially true in connection with problems that call for the use of extreme conditions or operative techniques. The following lines of research may be taken as examples of this type of investigation: (1) The evaluation of sensory functions in learning, (2) the analysis of brain and neural functions in learning, and (3) the study of physiological conditions, such as those induced by drugs, fatigue, etc., and learning. In each of these fields, extensive work on human subjects is impossible for obvious reasons.

In animals, on the other hand, the proper conditions for systematic research in these several fields can, as a rule, be readily arranged. Many of the results secured, while not directly applicable to man, provide definite clues to the understanding of less extreme conditions in man. Moreover, in some cases at least, it has been possible to check such findings directly on human subjects who have suffered accidental injuries of various kinds.

Intelligence Levels.—The methods employed in this connection differ in several essentials from those described above. In the first place, each method provides a series of tasks so graded in difficulty as to go beyond the capacity of the species being tested. In the second place, the animal is given practically unlimited opportunity to go as far as it possibly can on this graded series of tasks. The primary aim here is to determine the limits of capacity, in a given function, for various species of animals so that they can be directly compared as to intelligence level. This is surely quite different from the typical learning experiment in which a single task is employed under varying conditions of efficiency. In fact, these levels tests are similar in many respects to “power” intelligence tests in the human field, since speed is ignored in favor of utter limits of capacity. They have been devised to measure such complex behavioral functions as reasoning, imitation, symbolic, and relational responses. As might be expected, therefore, these methods have been utilized mainly in testing the higher animals and especially the primates. The following four methods have been selected to represent this general field: (1) Multiple-Plate method, (2) Delayed-Response test, (3) Multiple-Choice method, and (4) Imitation test. A general description of these and related methods will be found in a recent textbook.¹²

Multiple-Plate Method.—The general plan of the apparatus used in this test is shown in Fig. 7. The main features are as follows: (1) An entrance box leading into the large outer reaction cage, (2) an inner cage containing the food, and (3) plates in the floor, to be depressed by the animal in order to open the door of the inner cage and obtain the food. The basic response of stepping on a plate was utilized here because it is a simple and natural response for such a

large number of species. The plates are wired so that, if desired, a light electric shock can be given as a signal to the animal that the wrong plate has been depressed. The outer cage is made of heavy wire mesh, and covered with a one-way light screen to eliminate the experimenter from the test situation. The apparatus can be readily adapted to both large and small animals by varying the size as required.

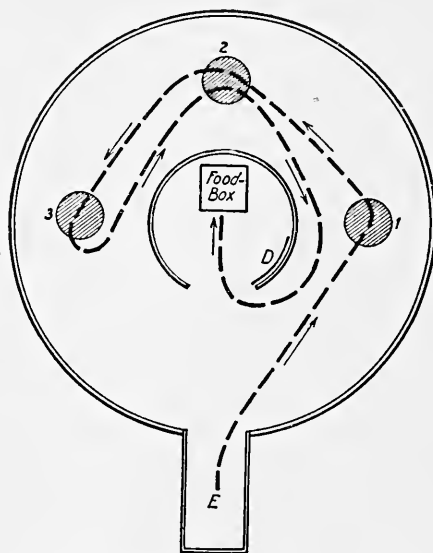


FIG. 7.—JENKINS PROBLEM APPARATUS (GROUND PLAN).

The three plates (1, 2, 3) are built with inlaid metal strips to permit the use of electric shock as desired. The door, *D*, is automatically closed when a set series of plates has been depressed. Door leading from entrance compartment to the main cage not shown in this diagram. The broken line indicates the route to be taken in step four in which plates are depressed in the order 1, 2, 3, 2, before door to food compartment opens. (From Warden, Jenkins, and Warner. "Comparative Psychology," Vol. I, by permission of The Ronald Press Company.)

The first task involves merely learning to step on plate 1. After this has been mastered, the later patterns are made increasingly complex by adding one plate each time as the animal advances from stage to stage. A new plate is added, of course, only after the simpler, preceding pattern has been thoroughly established by training. When the basic series of three plates has been mastered, the animal is required to reverse its direction thereafter at plates 1 and 3. For ex-

ample, the order of plates in the eight-step pattern would be: 1,2,3,2, 1,2,3,2, food box. The steps here seem to be fairly well graded in difficulty, except that the initial setting up of the plate habit (step 1) and the first reversal (step 4) require longer training as a rule. These exceptions do not invalidate the results to be reported, since the final failure point usually falls at other positions in the pattern series.

This method seems to be one of the best so far devised for the determination of levels of capacity in widely divergent species. This fact will appear from an analysis of the results that have been secured to date. The following scores represent the highest point reached by any individual of each species, when groups of 20 to 35 of the several types were tested:

Guinea pigs	Step 1
White rats	Step 2
Cats	Step 7
Monkeys	Step 22

Pre-adolescent animals of approximately the same relative age were used in all cases, and the motivation conditions were arranged in harmony with species requirements. The results would seem, therefore, to reflect genuine species differences in levels of capacity to form such complex ordinal patterns of behavior. It is interesting to note that the two rodent types (guinea pig, rat) stand much lower than the carnivorous type (cat). There is an abundance of evidence from other lines of experimental work to support this evaluation of the two mammalian orders. The high level reached by the monkeys on this task is also in harmony with measures of primate capacity secured on various other kinds of tests.

This method was designed to test the capacity of various species to form serial habits in an ascending order of complexity. Nevertheless, it provides an opportunity for the occurrence of a simple type of reasoning. This is especially true in the case of the animals which advance far in the series before reaching the limit. The only change in pattern, from stage to stage, is the addition of the next plate in the major sequence. After this shift has occurred a number of times, a simple inference might well develop, with respect to this constant

factor, as new patterns were set for solution. This would not involve the ability to count but merely the vague notion that man might express in the phrase: "Now I go on one move further." Clearly, such "insight" would have enabled an animal to continue through the simple linear series indefinitely. But nothing of this sort occurred, even in the monkeys that advanced farthest in the series and hence had the best opportunity to develop an inference. In fact, the results seem to show that progress from step to step was pretty much a matter of trial and error for all species tested. When a new problem was set, the animal persisted in trying out the old pattern for a time. The resulting failures eventually brought about a partial disintegration of the old pattern and a renewal of exploratory activities. Finally the new and more inclusive pattern, representing the next stage, might then emerge. As a matter of fact, there seems to be no consistent transfer of training effects running through the series of patterns as a whole. It is interesting to note that some of the monkeys became greatly confused, after prolonged training, at the final failure point, and appeared to lose entirely the pattern already learned. On being retrained on the old pattern, they always failed again at the same point as before. These facts support the conclusions that the limits scores, indicated above, actually represent the true level of capacity in the function tested.

Delayed-Response Test.—The general plan of the apparatus commonly used in testing the white rat is shown in Fig. 8. It consists essentially of an entrance box, a large reaction compartment, and three small adjoining food boxes which can be lighted as required. Grids for giving electric shock can be placed in front of each of the food boxes, when punishment for errors is to be given. The apparatus may be readily adapted for animals of different size, and the number of food boxes may vary from two to four as desired. The method is used to investigate the capacity of animals to utilize memory cues in responding to food situations to which they have been trained. A further problem here bears on the nature of such cues, once their presence has been demonstrated. This means of analyzing the representative aspect of animal behavior will become clearer after the application of the method has been discussed.

At first the animal is trained to go for food to whichever one of the boxes happens to be illuminated, the order being varied irregularly from trial to trial. When this habit has been firmly established, the training is continued under the following conditions: (1) The light is turned off just as the animal is released from the entrance compartment, (2) an interval of delay—perhaps only a second at first—is interpolated between the turning off of the light and the release of the animal, (3) the interval of delay is increased in length until a limit is found beyond which the animal consistently fails to locate

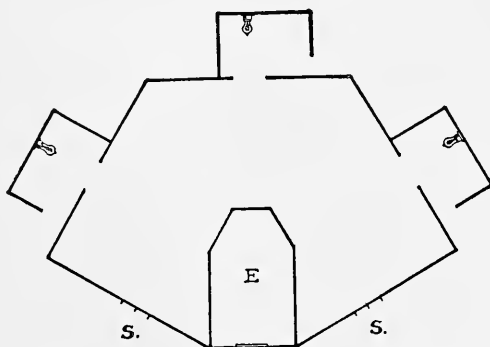


FIG. 8.—CARR-HUNTER DELAYED REACTION APPARATUS.

Ground plan of three-compartment apparatus. *E*, entrance and restraining compartment fastened by hinges so that when raised the three faces are raised some distance from the floor. Lights in the three compartments controlled by switches at *S*, *S*. Runways leading from exit doors to entrance compartment not shown. (Modified from Hunter.) (From "Behav. Monog.," by permission of The Johns Hopkins Press.)

the correct food box. In order to demonstrate that the response is due to the revival of a true memory cue, it is necessary to disorient the animal during the delay interval in some manner. This precaution is based on the fact that white rats tend to preserve bodily orientation, and dogs head orientation, unless it is prevented. Obviously, if the animal orients toward the proper box before the light is turned off, and holds this position during the interval, there is no reason to suppose that its final reaction involves a memory revival.

Interesting results have been obtained on the rat, cat, dog, and raccoon by this method, which seeks to probe into the memory function of animals. The trend of the findings favors the notion that

probably the birds and mammals make some use of simple symbolic processes, although the precise nature of these is not clear as yet. One might reasonably expect that the maximum delay period would be longer for the cat, dog, and raccoon than for the rat. But the results to date do not support this assumption, although it is only fair to say that the technique employed has varied considerably from one type of animal to another. Delays as long as 45 seconds have been reported on the white rat, when tested on a three-box apparatus, with bodily orientation eliminated. Corresponding indices for the dog and raccoon are 15 seconds and 25 seconds respectively. It seems likely, however, that further work under more uniform conditions will reveal a fairly high correlation between length of maximum delay and general intelligence level.

This tentative conclusion is supported by the results obtained on a different type of delayed-response test from that described above. This method was devised by Hunter and has the advantage of being less arbitrary and more direct than the older type of test. The food itself is used as the signal, hence there is no need for an early training stage. Moreover, the direct response to food doubtless insures better motivation conditions than the light-food combination. In any case, the period of maximum delay is much longer, for the same species, when this type of test is used. Delays as long as 16 hours have been reported for cats, even when a 4-box apparatus was employed. Chimpanzees are able to react successfully after an interval of 48 hours, when tested on a single-box set-up. In this case, the box is usually buried in the ground after the animal has seen the food put into it. On the whole, it would seem that this direct method offers more promise than the indirect method previously described in helping us to understand the use of memory by animals in their natural habitat.

Multiple-Choice Method.—This method was devised by Yerkes to bring into play ideational behavior, if present, in animals. The general plan of the apparatus, which can be modified for organisms of any size, is shown in Fig. 9. The number of test compartments may be reduced, if desired, in order to make the problems easier to solve. It is necessary for the animal to make use of some sort of

relational cue here, since the correct box to be entered varies from trial to trial, in harmony with a specific relational pattern. Let us suppose, for example, that the problem is to select the middle box in any series of compartments presented. The series is indicated, from trial to trial, by raising the front doors of some of the boxes, and the animal is supposed to react only to these. If the three doors to the right are open, the correct box is No. 2; if the 5 doors to the

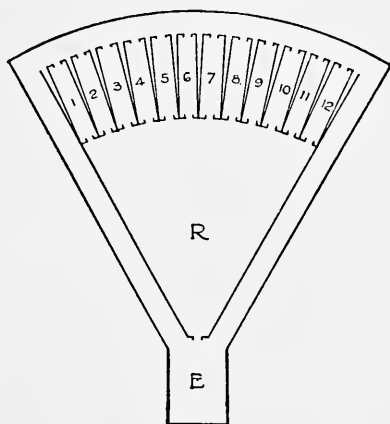


FIG. 9.—YERKES MULTIPLE-CHOICE APPARATUS (LOCOMOTOR).

Ground plan of apparatus with twelve test compartments. *E*, entrance compartment; *R*, reaction compartment. Note runways leading from exit doors at rear to the entrance compartment. (Modified from Yerkes.) (From "J. Anim. Behav.", by permission of The Johns Hopkins Press.)

left are open, the correct box is No. 10; if doors 4,5,6,7,8,9,10 are open, the correct box is No. 7. Clearly then the animal cannot solve the problem—middle box—unless it makes use of this specific relational cue. The problems that have been used most often in testing various species are: (1) Box at the left (or right) end of the series, (2) second box from the left (or right) end, (3) middle box, and (4) alternately left end and right end. A list of more difficult problems will be found in another connection,¹³ together with a description of an apparatus designed for primates, in which the response is reaching toward the correct box instead of going into it bodily.

In applying this method, the general plan is to begin with Problem No. 1 and then to pass the animal along until its limit is reached

on the more difficult tasks. The rating of species might depend either upon the total number of problems solved or on the difficulty of the problem which marked the limit of ability. The following records have been reported to date on various species tested on a 9-box apparatus, the numbers given here corresponding to the problems as listed above: Ring-dove, 1; crow, 1 at both left and right positions; white rat, 1; pig, 1,2,4; monkey, 1,2,4; orang-utan, 1; chimpanzee, 1 at both left and right positions, and 4. In all cases, the animals failed on one or more other problems, hence the record here would seem to represent fairly enough the relative ability of the several species tested. However, the number of individuals was relatively small in most cases. The most surprising fact indicated by these results is that the pig apparently ranks along with monkeys and chimpanzees in multiple-choice ability. Perhaps the record for the great apes will be raised by later work on larger groups. Considerable attention has been given to the problem which arises as to the nature of the relational cue utilized in solving multiple-choice tasks. Some hold that it is symbolic, or ideational, while others insist that it is merely perceptual in character. In any case, this method has proved to be extremely useful in the analysis of complex relational behavior in the higher animals.

Imitation Test.—One of the first questions raised in animal psychology was whether or not the higher animals can learn by imitating one another, as well as by the slower process of trial and error. These early workers held that imitation involved the drawing of a simple inference, such as that expressed by the phrase: "I see that monkey pulls a string and gets food; if I pull the same string I will also get food." This conception may be true but it would be most difficult to prove. At present, imitation is regarded simply as learning by observation. In order to demonstrate imitation in animals, it is necessary to plan the test in harmony with the following criteria: (1) The task must be something that is novel enough to require genuine learning; (2) the act must be performed immediately from observation, without recourse to trial and error activities; and (3) the pattern of the response in the imitator must be similar to that made originally by the imitatee. If learning occurs promptly, under these conditions,

the ability of the individual or species to imitate has been demonstrated. The limits of imitative capacity can then be determined by testing the animal on a graded series of tasks of increasing difficulty.

The Observation-Cage method, devised by Thorndike, was long used in imitation studies. The apparatus consisted of a work cage for the imitatee to which was attached an observation cage for the observing animal. After the latter had been given sufficient opportunity to observe the trained imitatee solve the problem, it was placed in the work cage to see if it would then repeat the act. Of course, the imitatee was removed from the work cage before the imitator was placed within it. This shifting of the animals required time, hence the response demanded was, in reality, a delayed reaction based on imitative cues. Moreover, it seems likely that the shift would bring about emotional disturbances and a change in mental set in the imitator. These difficulties in the method itself probably explain, in large part at least, why no evidence for imitation was found in such animals as the dog, cat, and monkey. Strangely enough, these animals can be readily trained to be good observers, and hence should be able to learn simple tasks by imitation.

A new method of testing imitation was recently devised by the writer in a size suitable for monkeys. The apparatus is shown in Fig. 10. The essential feature here is the use of two work cages, separated by a mesh partition, instead of a single work cage and an observation cage as in the method described above. This plan makes it unnecessary to shift either of the animals during the test, so that both delay and disturbances are avoided. Any number of tasks can be arranged by constructing duplicate sets of panels, which can then be inserted conveniently in the back wall of the two cages. For example, the task shown in the illustration is to push down two levers with the hand and then pull open the door and take the food from the small box behind. The procedure of testing is very simple. The imitatee, which has been trained to perform the act beforehand, is placed in one of the cages and restrained by a cord. The imitator is then placed in the other cage to observe, under similar restraint. After the imitatee has performed the act five times in rapid succession, the imitator is released and thus given an opportunity to copy the

act. At the same time, the imitator is drawn back into the corner of its cage by means of the cord. The time required for each imitative act can be taken by means of a stop watch.

Up to the present, this method has been used only in testing rhesus and cebus monkeys. The following tasks, arranged in order

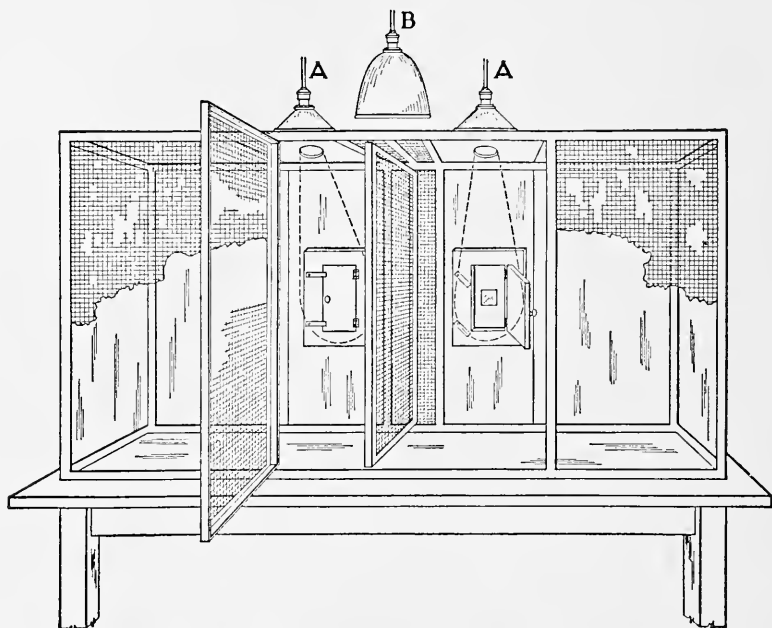


FIG. 10.—WARDEN DUPLICATE-CAGE IMITATION APPARATUS.

A part of the mesh forming the front wall has been removed in order to make the interior of the apparatus more visible. The cages for the imitator and imitator are similar in every respect. The double-latch device is shown open in one cage and closed in the other. The light at *B* supplies general illumination to the apparatus. The two lights, *A, A*, enhance the value of the latch devices as stimuli by flooding them with light. New devices can be substituted for those shown by changing panels. The two cages are separated by a wire mesh partition. (From Warden, Jenkins, and Warner. "Comparative Psychology," Vol. I, by permission of The Ronald Press Company.)

of difficulty, were employed: (1) Pulling a chain hanging down in front of the panel, (2) opening a door in the panel by the knob, (3) pushing down one latch and then opening the door, (4) pushing down two latches and opening the door. In each case, the animal was rewarded by food placed in the small box behind the door. Several

hundred tests were made on some 21 monkeys by repeating the series from time to time. If we exclude the records of six animals that refused to observe, on account of sexual or pugnacious attention to the imitator, the results indicate a high degree of imitative behavior in these types. In fact, in over 70 per cent of the tests, the act was copied successfully within the one-minute period allowed, and often within a few seconds. In some cases, the imitator was straining at the leash to get to the mechanism and operate it before the period of observation was over. A careful check of the performance indicates clearly that fumbling and other trial-and-error activities did not occur, when the act was copied in 30 seconds or less. In some instances, rated as unsuccessful, the imitator copied the act but not with sufficient precision or force to operate the mechanism. This type of behavior might well be termed partial imitation rather than failure. The best record made by an individual monkey was immediate imitation in 23 out of the 24 tests given to it. Although some of the problems used were fairly complex, as imitation tests go, the series of tasks was not difficult enough to determine the limits of capacity in monkeys. Until this method has been extended to birds and the common mammals, the question as to whether or not the imitative function is limited to the primates must remain unanswered.

There are a number of other tests of intelligence level which have already been standardized for use, but these cannot be described here for lack of space. A brief treatment of the Quadruple-Choice method and the Box-Stacking test is given in the volume cited as a general reference at the beginning of this section. More recently a method of testing manual instrumentation, or tool-using, in primates has been developed and applied successfully to monkeys and chimpanzees. The results to date show clearly that both of these types possess the capacity to solve fairly complex problems involving the use of sticks and rakes in continuous and broken sequences.

As we have seen, the several tests of intelligence level, described in this section, have made possible the analysis of various complex behavioral functions in the higher animals. Any final rating of species must, of course, be based upon the records made in all of these functions, rather than upon the results of a single test. It would

seem hardly necessary to point out here the important bearings of such investigations on a sound interpretation of the basic structure of human behavior.

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CHAPTER IV

CHILD PSYCHOLOGY *

By HORACE B. ENGLISH, *The Ohio State University*

Psychologists and laymen alike are deeply interested in the behavior of children. Long before Freud, practical wisdom had recognized that "the child is father to the man." The differences between men—in abilities and achievements, in disposition and character, in emotions and temperament—all have their roots in childhood. In these same experiences of early life we also find much of the explanation of the great similarities which are expressed in the general laws of human behavior. It would be something of an exaggeration to say that all psychologists must be child psychologists, but it is no exaggeration at all to say that anyone who would understand the progress of modern psychology must be familiar with what we have learned about children in the last fifty or sixty years. †

There is another and obvious source of interest in child psychology: The practical concern of parents and teachers to understand and rightly direct the development of the young. All great educational movements have been based upon conceptions (or misconceptions) of the nature of children; and evidence which we shall later survey indicates that social and political progress may depend upon our learning more about the forces which mold the lives of all of us in childhood.

As samples of child psychology, two topics will be discussed in sufficiently concrete detail to illustrate problems, methods, and conclusions. They are followed by a survey of the major theoretical issues and problems of this field.

* A considerable part of this chapter will appear in expanded form in a textbook of child psychology by the same author.

† A surprising number of ways of investigating child behavior took form about 1890: One of the earliest and most influential baby biographies (Shinn); the beginning of questionnaires about child behavior; the first tests; the clinical studies of Freud; and a notable change in direction in studies of feeble-minded children.

THE DEVELOPMENT OF EMOTION IN CHILDHOOD

In view of the frequency with which we are inclined to characterize a person as "emotionally immature," it is surprising how seldom we get a definition of emotional maturity. One reason, of course, is that it is far more difficult to say what an emotion is than the layman might think. Even the term emotion is misleading since it implies a sort of state or entity, whereas the fact we are talking about is a sort of activity for which the verbal noun "emoting" would be more suitable. Some theorists deny that there is any characteristic common to all emotions which justifies us in considering them together. We believe, however, that the common characteristic of the kinds of behavior called emotional is given by the following definition: Emoting is an action, spread out in time but possessing a certain internal unity or wholeness, integrated around the activities of internal adjustment. (The activities of internal adjustment are mainly those often miscalled visceral.)*

There is also a specific difficulty in defining *maturity* in this area of behavior. Physical maturity is a fairly simple concept and so is intellectual maturity. But emotional maturity? Isn't the very phrase a contradiction in terms. As someone once said, emotions don't develop or mature, they explode. According to this view, emotion is essentially immature. Perhaps, however, if we compare immature with mature persons, young children with older children, children with adults, we may discover characteristic differences in maturity of emoting.

Differentiation in Infancy and Early Childhood.—The emotional behavior of the infant, like all his behavior, is relatively undifferentiated. By this we mean that in the first three or four weeks, we find only a sort of generalized excitement or agitation in response to any sort of strong stimulus. This excitement is characterized by vigorous but ill-coordinated movements of the infant's whole body, with little discernible relation to the stimulus. Observers generally have difficulty in naming the emotion, but they almost universally

* This characterization of emotion is more fully expounded by the writer elsewhere.¹ Closely related theories of the nature of emotion have become fairly common.

concur in calling the behavior emotional.* Gradually, however, although simple excitement continues to be displayed, two new patterns of response begin to appear—namely, distress and delight, distress appearing as early as the fourth week, delight somewhat later. The evolution of new emotional experiences out of simpler and earlier forms is what we mean by differentiation.

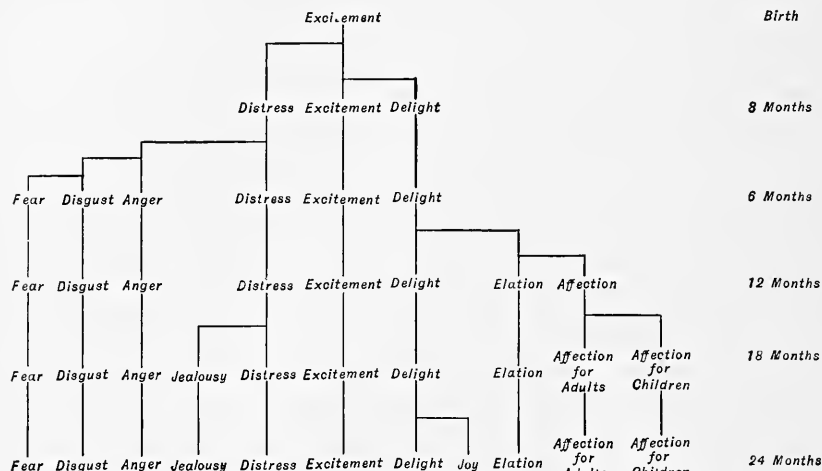


FIG. 11.—EMOTIONAL DEVELOPMENT IN EARLY INFANCY, *Child Development*, 1932, 3, 324-341. (From Bridges, Katherine Banham. Quoted by permission of the author.)

“Distress in infancy,” says Bridges⁴ in summarizing her extensive study of a group of foundling children, “is characterized by muscle tension, interference in breathing, change in facial color, trembling and crying. . . . Delight in an infant is characterized by relaxation of tension, or normal tonus, gurgling of saliva in the mouth and by free random movements and soft vocalization. . . . As the infant develops, other emotions may be recognized. . . . [They are distinguishable from each other] more by the specific motor responses than by the visceral responses. The particular

* See, for example, the studies of Sherman² and Goodenough.³ The fact that in such studies as Sherman’s the behavior is unhesitatingly called emotional, even though it is difficult to say which emotion, has usually been overlooked but is essential to full understanding.

emotion is also [distinguishable according to] the nature of the situation which prompts it, including both the internal bodily and external conditions. Thus distress becomes differentiated into fear at sudden shock and anger at interference. Delight also becomes further differentiated into joy and affection." And these in turn are further differentiated as shown in Fig. 11.⁴

It should perhaps be emphasized that emotional patterns which bear the same name do not remain the same with age but also differentiate. The excitement which breaks what Jersild calls "the somnolence of the newborn" is not the excitement of the two-year-old, nor is the latter the same as the excitement of the nine-year-old. But there is a real genetic relationship; the later emotion grows out of and is definitely influenced by the earlier. It is important, too, not to exaggerate the sharpness of distinction between emotions. Even in ourselves, let alone in infants, it is often difficult to say just what sort of emoting is going on. *One emotion grades into another by imperceptible degrees as do colors in the rainbow.* The naming of separate emotions is more of a literary than a scientific task. The "typical distress" pattern doubtless differs from "typical anger" but in between are innumerable unnamed gradations. And anger and fear, delight and joy, or joy and elation are similarly connected by intermediate ways of acting.

A further difficulty in sharply discriminating between various kinds of emoting comes from the very considerable degree of individual variability. The development of emotional behavior is partly determined by experience, of course, and life experiences obviously differ from person to person, especially after the days of early infancy. There are, accordingly, great differences in the emotional patterns which unfold.

The pattern of overt or visible behavior certainly is highly individual. Thus Goodenough⁵ in her study of anger in young children lists kicking, stamping, jumping up and down, throwing oneself on the floor, holding one's breath, pulling, struggling, turning the head, pouting, frowning, throwing objects, grabbing, biting, striking, crying, screaming—and a number of others. Of course, no single child is quite so talented as to display all these forms of angry

behavior, nor are they all elicited by quite the same situations. When we try to think of all these as parts of the same emotional pattern, it is somewhat bewildering. And yet recognizably they all are.

The inciting conditions to emotion show similar variations. An abrupt stimulus for which he has no ready-prepared response will elicit fear from the young child—from any young child. What sort of stimulus, however, fits the description given? Almost anything, depending on the child's previous experience. Sudden loud noises will usually evoke fear in a young child; but if he has been subjected to many such noises, they cease to be, for him, sudden and unexpected.* On the other hand, depending, again, on what his experience has been, things which the child once passed without special notice become "unusual" and "fearful." "New things startle him because of his keener perception of the fact that they are new and unusual. . . . Fear arises when we know enough to recognize the potential danger in a situation but have not advanced to the point of complete comprehension and control of the changing situation."⁸ The case with other emotional patterns is parallel.

Finally, there is evidence that the internal responses are also variable, although doubtless less so than the external. As Bridges⁴ says, "A child who loses his appetite with excitement during one stage of his development at a later stage may be very excited without the accompanying loss of appetite. . . . Thus visceral pattern reactions, like any other form of behavior, seem to undergo processes of differentiation. . . . Partial or specific autonomic nervous responses seemed to be conditioned through experience just as [are] specific responses." To this picture of variation in the pattern of emotional response should be added the rather wide range of individual susceptibility to emotive stimuli noted by Shirley,⁹ and Gesell and Thompson.¹⁰ †

Practically important as the differences are, we ought not to exaggerate them. There is a characteristically human way of life, and this breeds in humans, with their specifically human dispositions,

* The issue is discussed by Valentine⁶ and by English.⁷

† There is reason to think this difference in susceptibility is closely connected with the inherited glandular structure of the infant.

certain characteristic human ways of emoting.* Even vastly different cultures are more alike, particularly as they affect infants, than popular anthropology would lead one to think. In Samoa and in Picardy children find themselves faced by baffling and sudden changes—and cry out in fear. (If they are old enough, the cry will be in Polynesian or French, respectively.) In Tibet and in Connecticut, children are thwarted and interfered with—and angrily resist. It is hard to imagine a society in which this would not be so. The combination of common circumstances and of common heredity is a strong one. It is unlikely, therefore, that we shall see any of man's distinctive emotional behavior completely uprooted. And yet a note of caution! In some societies, parents sternly repress angry behavior even in infants; in other societies infantile rage is encouraged. Very considerable quantitative differences in the emotional behavior characteristic of these societies are thus engendered. The picture which emerges from this survey is that of a kernel of universal, or nearly universal, emotional behavior patterns based on innate factors and growing out of the universal experiences of the race. We may, if we like, speak of the inevitable maturing of such behavior tendencies; it is equally proper, however, to speak of them as inevitably learned. In quality and in their role in the individual's life, there is no difference between the primary and universal behavior patterns and those which are learned in response to more individual or special circumstances of life.

Learning to Emote: *Conditioning*.—One way in which emotings are learned—some psychologists think it is the only way—is through conditioning. The first reported experiments were those of Watson and Rayner.¹² An infant who was happily playing with a white rat was badly frightened by a crashing noise; thereafter he cried and retreated in obvious fear whenever the rat was brought near him. Moreover the fear transferred to somewhat similar objects

* In fact, we share some of these emotional ways of acting with the apes and even with others of the higher animals. It is true that some psychologists have rejected such a belief as "unscientific anthropomorphizing"—surely a sufficiently devastating criticism! D. O. Hebb¹¹ has shown, however, that it is possible to identify some of the same emotings in primates as in man. He does show also, be it noted, that the task is not as easy as popular opinion implies.

such as a rabbit. The experiment has since been repeated in various forms, not always successfully, but often enough to show that learning of this type actually occurs.

The principle of conditioning may also be applied in reverse. Finding that five-year-old Peter was afraid of furry animals (and fur coats), and of feathers, M. C. Jones¹³ set out to de-condition him. He was exposed simultaneously to two stimuli, a fear-exciting rabbit and pleasure-exciting food. Care was taken, however, to insure that the latter was the stronger by keeping the rabbit at a considerable distance at first. Little by little on successive days the rabbit was brought nearer and nearer while Peter was happily eating until finally the day came when Peter spoke to the rabbit, patted it, and feared it no more. And not only the rabbit. A white rat, worms, feathers, and various furry objects were accepted with equanimity. By "unconditioning" to the rabbit, Peter had been helped to overcome many superfluous fears, some completely, others to a less degree. His tolerance for strange animals and unfamiliar situations had apparently increased.

This is generally and properly spoken of as the extinction of fear; but note that it is just as properly spoken of as the acquisition of a friendly feeling toward the rabbit. Important to note, also, is the fact that this technique is double-edged and requires careful handling. Had the rabbit been too rapidly introduced, instead of transferring his pleasant feeling from food to pet, Peter might well have transferred his aversion from rabbit to food—exactly such aversions to foods have been set up.

Later studies of conditioning have shown that it is far from being the delightfully simple principle it once appeared to be. Straightforward conditioning takes place in a highly artificial situation *where nearly all competing stimuli are excluded*. One is tempted to say, in fact, that conditioning is the way we learn when all better ways are ruled out. Certainly the learning that takes place in ordinary life, whether we call it conditioning or not, is not a *simple* linking of stimulus and response.

Thorndike¹⁴ has suggested that association takes place only when the stimuli or objects *belong together*, and this seems a pe-

cularly apt description of emotional conditioning. Objects (or events) *which seem to belong* in an emotion-exciting situation take on the prevailing stimulus-value of that situation, and this shift or transfer may take place without any special "intent to learn," or even without the child's realization that he is learning.

It is clear how important this sort of learning can be. Irrational and unreasoning likes and dislikes, fears, antipathies, attractions may thus be set up in even very young children, *and unless dislodged they may become permanent*. A very great deal of our emotional learning is definitely accidental.

Emotional Climate.—Does this mean that we can do nothing about it? Not at all. For one thing we can bend every effort to insure that the total environmental "atmosphere" shall be such that the right kind of "accidents" have a chance to happen. A great deal of emotion is caught, not taught. The effect of "atmosphere" in determining emotional response has been verified by a number of investigations, but indeed it lies open to even casual observation. An infant secure in its mother's lap will gurgle with delight at antics designed to amuse him. Deprived of that secure position, however, he may be terrified by just the same behavior. A fifteen-months-old child who was terrified by the appearance of patent-leather dancing shoes shining strangely in brilliant sunshine ran to the "sanctuary" of her highchair. There, however, she allowed the shoes to be slipped over her feet and played with them happily. But when child and slippers were removed from the safety of the highchair to the floor, the fear returned but with lessened force.⁷

A number of practical implications should be apparent. Consider first the attempt to improve conduct through punishment. Here the emotional coloring is one dominated by pain and thwarting, and this atmosphere tends to attach itself to everything in the punishing situation—particularly, of course, to the central figure, the person inflicting the punishment. (All too often, however, the painful emotional coloring does *not* extend to the misdeed which, being over and done with as far as the child is concerned, is not effectively

made to belong in the punishing situation.) Is it any wonder that the effect of punishment is often only to make "ideals" seem hateful? They are preached in an atmosphere of pain and resentment.

As a positive implication we may set it down that the first introduction of anything which seems likely to be disturbing should be made in a situation where the child is secure, at ease, and happy. And more generally, *no effort to keep either home or school a genuinely happy and pleasant place can be considered excessive.*

Direct Imitation in Emotional Learning.—Somewhat similar is the situation where the child's response is not merely modified by the current emotional tone but is a direct imitation of it. To say that a child learns by imitating is not in any fundamental sense to explain but just to describe what is happening. The child observes others' behavior and copies it in his own. As a result, he learns new modes of emoting.

The Payne Fund studies of the influence of motion pictures¹⁵ found ample evidence that children directly—perhaps deliberately—copy the emotions shown on the screen. Many fears and prejudices are learned by little children without any direct experience with the offending object but merely by copying the emotions of family or associates. The glee of other children in anticipation of some treat imparts itself to the child who doesn't know what it is all about. Dislike of the teacher is quickly communicated to the new pupil.

Important for permanent learning is the quiet absorption of the habitual emotional tone of those about one. A fearful child may learn calmness from being near a calm child. Unfortunately, the reverse learning is more likely, since fearfulness is usually more dynamic than calmness.

It is thus fortunate that parents and teachers—unless they have forfeited it—have prestige-authority in the eyes of children. The adult can more easily set the tone of gaiety or severity, of nervous tenseness or of calm, than can a child. Teachers can develop an "atmosphere" in a schoolroom, even when the major trend of the atmosphere is contrary to the previous experience of the children. The flurried mother or teacher "teaches" the child to be jumpy; the

quiet, calm adult teaches the child to meet life without excessive emotionality.

The Influence of Words in Modifying Emotions.—Just because you have found it impossible to check emoting by cautionary or reassuring words, do not underestimate their role in emotion, particularly in modifying emotion. Words, in the first place, may acquire the power to arouse emotion in the complete absence of any relevant experience; and words may modify our emotional response to actual objects or situations.

For the first kind of learning the surveys of fears by Jersild and his associates¹⁶ are very much to the point. They found that a large percentage of the fears in the elementary school period are of objects or happenings with which the children have had no direct experience whatever. They fear animals, even though they have never been attacked by any animal let alone the "lions," "bears," and "wolves" of their anxiety; they fear "criminals," "burglars," "bad men," supernatural agents like "ghosts" or "pixies," and "death" (even though in most cases no death-like separation from loved ones has ever been their lot). By purely verbal stimulation and without any frightening event, full-blown fears have been induced. The process is not different apparently with other ways of emoting.

Equally familiar is the way in which words modify our emotional response to actual objects or situations. Inform someone who is idly examining a harmless-looking metal object that it is a hand grenade which will explode if he sets off the trigger and you will easily enough induce in him a healthy "concern," if not acute terror. Words have almost magic power to change the way we look at things and hence to change our ways of reacting to them emotionally.

Of course it is possible to mismanage the verbal manipulation of emoting. Telling a child, "Now don't be afraid, the nice doctor won't hurt you," is certainly a prize way *not* to control fear. But is it an example, as some have thought, of the failure of verbal stimulation? Or is it not an example of how verbal stimulation may excite emoting of an unintended character?

In most cases, words excite the very emotion we seek to diminish. Reassurance in the case of fear, for example, merely keeps the fearful situation in the forefront of attention and thus intensifies the reaction; and telling a child that he isn't hungry and that the ice cream here in the amusement park is dirty merely reminds him that he *is* hungry and that even dirty ice cream tastes good.

A more subtle, indirect approach is necessary if we are to break down an emotional habit by means of words. To oversimplify a very complex issue, telling a child, "Don't be afraid of the nice doctor," won't work, but telling him stories about doctors and about how nice they are—well in advance of the time the doctor is needed—will, if skillfully done, build up a favorable picture of doctors in the child's mind. The trick is to alter the emotive value of a situation, and language is perhaps the chief means whereby this is done, the chief means whereby we can impart to others a changed perspective on the situations in which they are placed.

As we have implied in this discussion, young children are not the only ones to build up emotional responses around verbal stimuli. In fact it is quite the opposite. It is only the very young child who is the "realist," who reacts to things just as they are. As he grows older his emotional reactions are more and more contaminated by verbalization; more and more he responds to things as described or as thought about.

In the early years at school, however, the symbols which arouse emoting are still quite concrete: Such things as a "bear" (nonexistent as a real bear in the child's experience but still a concrete object), and a prospective "holiday" (not yet there, but full of concrete imaginings). Gradually the verbal incitements to emoting become more abstract, but it is only toward the end of childhood that emoting is aroused by highly abstract notions like "duty" or "gratitude." Nearly all prejudice and a large part of practical morality is simply emotion attached to words. For both good and ill, then, verbal modifications of emotion are of extreme importance.

Modifying Emotion by Mastering the Situation.—In the case of children more direct ways of modifying emotion may be needed

and are available. Here again the studies made of fear are illuminating. Procedures that help the child to face and *deal effectively* with the feared situation have been found by parents to be most helpful, whereas "ridicule, ignoring the fear, or forcibly compelling the child to face the feared situation were of little help."¹⁶

The effectiveness of helping the child to master the *situation* instead of attempting to master his fears was put to the experimental test with preschool children by Holmes.¹⁷ In one series, the children who feared the dark were shown how to turn on the light in a dark room if they needed it. Presently they were traversing the dark room to get to the light switch without any expression of fear. In other experiments they learned to walk a plank raised some height above the ground by proving to themselves that they could manage the task when the plank was only a few inches high.

Anger also is quickly brought under control or altered as soon as one learns how to deal effectively with the anger-provoking situation. Control or re-direction of the emotings which stem from delight probably follows the same principle. The almost prostrating or suffocating joy over the new bicycle gradually takes on a different tone as one learns to ride it; mastery of the situation brings with it a constructive change in even joyful emoting. Familiarity may not always breed contempt, but it does lessen joy as well as fear or anger or disgust. Nor is this regrettable. As we master the situation, as we make our adjustment to whatever it is that stirred us up, we are ready to move on into new experience, to new achievements. Merely static enjoyment of that which we have mastered is as stultifying to development as a stereotyped or enduring anger or fear.

Emotional Language.—As a child grows older, he increasingly substitutes verbal responses and other forms of emotional expressions for direct action. Although, as Goodenough's work shows,³ emotional expression is built around a core of native reactions, it is not an innate endowment. All the finer shadings of emotional communication have to be learned just as other forms of language have to be learned. The emotion of little children may be an open book; if so it is a book written in a childish scrawl and communicating only

the most undifferentiated "emotional story." Young children have not, it is true, learned to dissemble their emotions; what they communicate is therefore true as far as it goes. But they have not learned by voice and words and gesture adequately to convey their own emotional state. Thus Sherman² in an oft-quoted study proved that not even skilled observers (nurses, obstetricians, psychologists) could identify the emotions displayed in motion pictures of the newborn. Goodenough³ showed, however, that observers could make rather crude but correct identifications of a ten-months-old infant. Kwint¹⁸ found that there is a steady gain throughout childhood in what might be called emotional vocabulary; that is, that children are better able as they grow older to communicate to others how they feel, not only by words but by gesture and the whole range of emotional expression. In large part this is because they move toward a relatively stereotyped or standardized expression.¹⁹

Of equal or greater importance is the child's growth in understanding of the emotional expressions of others. Here the experimental studies are scantier, but G. Gates' report²⁰ confirms much everyday observation that, contrary to one bit of folklore, older children can judge the emotion being experienced by others better than younger children.

It is true that children (and dogs and other pets, too) sometimes have an uncomfortable habit of seeing and responding to the total behavior of a person; and are thus not misled by insincere endearments and the like—these, of course, are part-behaviors intended to be observed but not really representative of the person's total reaction. Normally, however, there is a steady growth during childhood in understanding emotional communication and hence a growth in social sensitivity.

The Need for Training in Emotional Expression.—The expression "steady growth" must not mislead us. That steady growth is a matter of averages, it conceals a tremendous range of individual differences. And the fact that the average shows a rise from year to year does not indicate that the children are learning as much as they might or as they need, or even that every child is learning.

The problem is particularly acute in the first school year. Children come to school with a limited experience with people outside their own families. They have learned, little by little, to know what a certain tone means when mother uses it, how to interpret father's weary and discouraged slouch. Every family, however, has its own emotional peculiarities, its own "dialect" of emotional communication. Thus when the child encounters the teacher with her quite different emotional idiom there are grave problems of communication.

Nor is it merely the teacher whose emotional dialect is mysterious. For many a child, school is unfortunately the first extensive experience with children from other families; to all children, school brings with it an increase in the number and variety of contacts with peers. No wonder, then, that the child is frequently bewildered by the differences in emotional expression which greet him at school.

Maturity as Emotional Control.—We have hitherto been skirting around the outstanding problem in the field of emotion. When one listens to parents and teachers one is apt to get the idea that the only problem is how to control, if not outright to suppress, the emotions. The schools, as Lois Murphy²¹ points out, are so concerned with a well-ordered routine that they tend to make freedom from emotion the negative standard to which children must conform.

Wild-and-woolly emotionality, we must admit, is immature and gets us into trouble if indulged in when we are "old enough to know better." In an infant or very young child boiling rage at being thwarted is normal; in an older child it is a behavior problem or temper tantrum; in an adult it is a sign of psychoneurosis. The mature person may not be one who is able to suppress emotion altogether; but he is certainly one who is able, when needful, to keep his emotions well in hand. Nonetheless we may well question whether the changes in emotion necessary to growing maturity are to be attained merely through suppression.

Would we wish human life to be free from cheerfulness, exultation, amusement and laughter, merriment, rejoicing, or the trans-

ports of love? Is the ideal of conduct the stolid lack of feeling of the Indian—and the cigar-store wooden Indian at that?

We meet here an argument that has raged among men for at least three thousand years. Does happiness come from restraint or self-expression? On the whole the modern temper is for full and exciting expression, for abundant living.

Yet in our training of the young we do not act so. We take very seriously our task of teaching emotional restraint; the expression of feeling, the guidance of emotional development for richness of living is largely ignored. We talk about “socially approved,” but not of “socially effective,” emotion. We worry, as Lois Murphy says,²¹ about emotional shock or “trauma”; we pay little attention to emotional shallowness.

Our goal should be to strengthen the child’s ability to emote in appropriate ways, not to weaken it. Remembering that emotional behavior has to be learned, our aim should be to encourage and stimulate spontaneous emotional responses. We need, however, to take great care to structure the emotional situation so that the child will learn to emote spontaneously in socially effective ways. The joy which comes from helping a comrade or in achieving a cooperative enterprise is not just a natural endowment; it has to be learned through appropriate experiences. Thus we should see that the child has warm and friendly relations with responsive personalities—particularly of his own age. There must be times when the child is encouraged to be gay and exuberant as well as times when he learns that others don’t feel like sharing his gaiety.

The picture of emotional maturity is not, then, that of tight-lipped suppression of all natural feeling and expression, of stoic calm and indifference, of obedience and “discipline.” Neither is it that of unrestrained expressionism, or of a mawkish sentimentality in which one seeks merely to enjoy one’s own feelings. *Emotion, like any other kind of behavior, is a way of getting things done.* Like any other kind of behavior, therefore, it can be excessive or deficient, judiciously directed or wide of the mark—in need, therefore, of regulation. Simple suppression, however, is clearly not the mark

of emotional maturity nor a goal of emotional education. In a mature person, emoting is a positive mode of adjustment, the servant of the individual's purposes and goals.

THE CHILD'S REACTION TO AUTHORITY

Dependence and Compliance.—Man's reaction to authority, like all his social behavior, has its roots deep in his earliest years. Now above every other animal, our species has a prolonged and helpless infancy. During all his most plastic years, the child is dependent upon parents or other adult superiors for his very survival. To them he turns for food, protection, support, and assistance of varied character. Where, even in the most totalitarian society, is there any authority for adults like that which rules the behavior of the infant and very young child?

From the fact that dependence-reactions very similar to our own are found in apes and other mammals, it seems likely that these responses are not simply the result of training or tradition but have an innate basis.²² They are not to be thought of, however, as a single "instinct" of dependence-compliance but rather as a group of ways of reacting to authority. Because of our prolonged infancy, we all learn some of these dependent-compliant reactions; but because of differing experiences, we do not all of us learn the same ones. Compliance, then, is an inevitable mode of behavior, but the particular modes of compliance are not inevitable. Whether dependence and compliance be regarded as one set of reactions or two is mostly a matter of convenience. Compliant responses, as more dynamic, more active, and therefore more important, will receive most of our attention.

Fortunately, of course, adults are usually tender and loving in their care of the child, especially in their care of the very young child and infant. We laugh at the Duchess' admonition, "Speak roughly to your little boy, And beat him when he sneezes" because it is so foreign to our usual treatment of the helpless young. Thus, authority is first present to each of us in a mainly benign and friendly

form. She who is the first authority for the child is also the source of satisfactions, and the first object of love. Attraction, not compulsion, as Morton puts it, is the condition of authority.²³

Identification.—Now when we love someone, we tend to identify ourselves with him or her. His goals become ours; compliance with his wishes, yielding to his direction, do not involve self-abasement or personal loss. In the very young the beloved person's suggestions are simply carried out with satisfaction; the mother says, "Show papa how big you are," and the child complies, usually with a happy smile. Later the identification may become more conscious, and we feel that yielding to the beloved authority is the way to the attainment of some of our own most enduring purposes and values. The identification with a beloved parent or with Society as a parent-substitute is the motivation for a large part of our socially useful activities.*

Resistance.—From the first, however, the attending mother is also, and inevitably, the source of dissatisfactions as well as of satisfactions, the author of deprivations and hence the object of resistance, displeasure, and anger. Resistance to the parent's authority, therefore, like compliance, begins early—in the nursery, if not in the bassinet. Adequate controlled studies of its early development are lacking, but the investigations of Rust,²⁴ Caille,²⁵ and Reynolds²⁶ indicate that in our culture certain manifestations have already reached their peak at about age two or three. It is at this time that the child is most likely to resist even the simplest suggestion or verbal request.

It is clear that both compliance and resistance, and their correlated feelings of love and hate, are displayed quite early in human

* Bridges⁴ finds evidence for the appearance of a distinct emotional pattern of affection at eight months, but this affection is a refinement of an earlier-appearing, vaguer, emotional pattern which she calls delight. When we have "delight" in the attending adult, as we do as early as the third or fourth month, we have the basis for the loving identification of later months and years. The topic of identification is dealt with in many clinically oriented books.

development.* And different as they are, they are nonetheless responses to the same person or kind of persons—the attending adult superior. Compliance and love, resistance and hate, spring from the same source in the infant's dependence upon the adult for satisfaction and dissatisfaction. Only slowly are distinct emotions and attitudes differentiated out of a common matrix of personal relationships.

Gradually, however, distinctions and differences appear; the undifferentiated social response gives way to the differentiated responses of loving and complying, and of hating and resisting, and these in turn take on further variations. A whole cluster of reactions—emotional dispositions, sentiments, attitudes, habits—form round the parent as authority.

Bipolar Attitudes to Authority.—There is reason, however, to believe that because of their common origin these apparently divergent responses are closely connected throughout our lives. The case has been well put by a perceptive contemporary novelist and poet, Rebecca West:

“Every human being is born the enemy of all others with the instinct to fight for his existence and appetities against his kind. Our fathers and mothers, our husbands and wives, our children themselves . . . find their egotism broken down by their irrational disposition to love us, and our own egotism is broken down by our response to their love. Divided by . . . our fluctuating partisanship to love and hate, we wrestle together. . . . Those who are outside our mystery, who cannot be trusted to see that however much we hate we also love, should not be permitted to observe us.”

* We are here following a common usage in speaking of all relatively enduring attitudes or sentiments characterized by affection as love. Despite all the differences between the manifold varieties of love—love of mother or father, love of mate, love of comrade, love of country, love of pets, love of God—it is believed that a common element runs through them all so that all genuine love responses belong together in a distinct class. Our use of hate or hatred for all the contrasted varieties of sentiment which are characterized by antagonism may be less readily accepted. Social or ethical taboos upon hating have made us unwilling to admit the essential identity of our “dislike” with mild hatred; but the identity is just as truly there as in the case of love.

Indeed some students of behavior problems hold that we are always thus somewhat bipolar in our attitudes, so that to hate is also in some degree to love, to resist authority is also to be ready to comply with it; and in each case *vice versa*. Perhaps this is an extreme view based on the study of more or less abnormal cases. Yet we cannot deny some connection. We recognize the acuteness of Congreve's observation, "Hell hath no rage like love to hatred turned," and we may also note cases of the easy reverse progression from angry rage to tender affection. This much, then, is clear: That we pass from one of these attitudes very freely over to its opposite, especially in childhood.

Likewise important is the way these feelings complicate the overt behaviors of complying or resisting. We have already implied that originally the dependence-compliance reaction is correlated with love, and the resistance reaction with antagonism or hatred. But other combinations also develop in the course of the child's experience. The combination of compliance with hatred is by no means uncommon—it gives us a dull, sullen yielding to authority quite unlike that found where there is loving identification of the child with the parent. And strange as it may seem, love and resistance may also get entangled. Thus curiously intertwined are the attitudes and emotions which constitute the basic reactions to authority.

Individual Differences in Reaction to Authority.—So far, we have stressed the universal or at least the common features of a child's reaction to authority. These grow out of the common features of early life; all of us are born as babies and have attending mothers, and all of us are dependent for many years upon adult care. The similarity of experience thus involved imposes a great similarity upon us in our reactions to authority. We all learn many of the same lessons because the same things happen to us.

Yet within the framework of these universal relationships there are also great individual differences. Even infants do not have exactly the same experiences; and as children grow older, the range of variability in individual experience becomes enormous.

Much of this variability is due to accident. By accident here we mean merely an unforeseeable relation between the child's momentary inner state and some concurrent event in the outer environment. Thus the removal of the nursing bottle just at the moment when a sudden colic spasm takes place within the child's organism may initiate a chain of learnings which in the end will have quite striking consequences. The mothers' casual interference with a child's activity on one occasion may have almost no effect; but on another occasion her interference may run contrary to the child's strong impulses and thus give rise to strong outer or inner opposition. In such case, the first steps are taken toward a habit of resistance which comes in time to dominate the mother-child relationship. Many little twists of personality are determined by such a cumulation of "accidents" of intrinsically no great consequence.

Of greater importance, however, are the variations in the pattern of development due to regular and more or less predictable differences in the individual's experience. The obvious differences between parents make for equally great differences in the children's reactions to authority. The way in which authority is exercised is, of course, no less important. Thus, in some homes a certain frigid and unaffectionate rigidity of control is uppermost; in others we get insistence upon affection as the basis for obedience; in still others anger and punishment are almost the only instruments of parental control. A few modern mothers try to "reason" with the child almost before he can talk; others seem to believe that the louder they shout the more prompt and more certain the child's obedience. Some parents try to enforce obedience by the threat of withdrawing their love. Few homes, moreover, display a consistent pattern of authority; and, in some, inconsistency is elevated almost to a ruling principle; injustice and overseverity alternate with overindulgence.

As the child develops, moreover, his different attitudes toward authority interact with each other, and that brings further changes. The way he has learned to comply influences the way he resists; his experiences of resistance influence his compliance. The child whose parents are domineering and authoritative is, of course, usually com-

pliant if not submissive; but when he does kick over the traces and resists duly constituted authority, his rebellion has a characteristically different form from that of the truly independent child or even from that of the habitual rebel. Similarly the child who has learned to defy authority at home may indeed submit to superior force; but his submission will be very different from that of the habitually meek. The child whose security has been threatened by punishment in the form of withdrawal of love is apt to be over-dependent or attention-seeking, or both. Children thus learn a most baffling diversity of ways of reacting to authority.

The Teacher as Parent-Surrogate.—It is easily apparent that the child transfers his attitude toward parental authority to other adults. Thus school children implicitly recognize the teacher's position as being parent-like, in some degree also recognize her personality as being parent-like. (She is at least an adult and has most of the adult ways with subordinates—that is, children—that the mother displays.) The teacher is thus inevitably a sort of mother-substitute or mother-surrogate.* The authority of the teacher, and thus her ability to exercise leadership, rests primarily upon her role as mother-surrogate.

Authority and Authoritativeness.—We must sharply distinguish, however, between *being* the person in authority and *acting* in an authoritative manner. *Authoritativeness is an attempt to bolster up authority by demands that it be "recognized" and by the exercise of repressive constraints or compulsions.* Instead of evoking willing compliance it compels obedience by punishment or the threat of punishment. Authoritativeness, so far from being the same thing, is the sign of the breakdown of authority, a sign that the parent or

* The transference to outsiders of family patterns of behavior, particularly the acceptance of mother substitutes without knowing it, has long been recognized by poet and novelist and is dealt with by many psychologists. The transfer of authority reactions which we are here considering is easily the most important form of such transfer. Recently, it has come to be recognized as an important factor not only in school but in industrial relations. It is not any less important at any age for being what Köhler calls "silent"—that is, showing in our attitudes without our knowing why we feel as we do.

teacher (or other adult) does not have sufficient personal or positional authority and must resort to other means to control the child's behavior. Authority is a relation between the leader and the led, not an act of the leader. *Real authority does not need to be asserted; it is accepted, and it works.* It does not require, and is not benefited by, bossiness or authoritative behavior.

Yet our whole culture is so shot through with authoritativeness that it is difficult for those of us who are in authority over children to keep the distinction clear. Moreover, authority is so pleasing to our own egos that when we find it limited, we are tempted to bolster it up, as we think, by demanding obedience. In the armed services authoritativeness was known as "throwing one's rank about"; it didn't work. Because, however, they have too often been brought up in an authoritative atmosphere, children may fail at first to recognize true authority unless it comes wrapped up in the trappings of an authoritative and domineering manner. They may need some time in which to learn to recognize authority in its less strident but more genuine manifestations.

Authority and Democracy.—It is clear that if the reactions to authority which are natural and inevitable in infancy persist into later years they create a special problem for democracy. And persist in some form they do. Moreover, as Lewin²⁸ points out, these habits of submission to authority can be reinforced by compulsion, whereas habits of democratic cooperation cannot in their very nature be imposed. The Declaration of Independence holds that all men are born free. It is psychologically sounder to recognize that all infants are born into submission to their parents. Each individual must achieve freedom on his own.

Yet we may provide or may deny opportunities which at least favor the development of growth toward independence. Much is said of the need for "psychological weaning" in adolescence; the problem begins much further back in the early days of childhood.

While the area of freedom granted the child by the typical American family is greater than in most European homes, we enforce the

rules we do have in a very authoritative fashion.* The rigidly-ordered, teacher-directed behavior of the traditional school offers little corrective to the authoritarian atmosphere of the home. The freer procedures which have in recent years crept into the schools at least open the way to a change: from excessive submission (tempered by occasional revolt), toward independence and cooperation.

That a less authoritarian atmosphere is beneficial is no mere assumption. An impressive volume of research bears on this conclusion. Most direct is the famous experiment in group leadership by Lewin, Lippitt and White.³³ Three groups of boys in a voluntary club were each exposed in a carefully planned experimental sequence to three kinds of leadership. In one the leader planned and laid out the projects, gave each boy his task, and supervised rather carefully the whole course of the work. Although his manner was friendly and pleasant, the leadership was very directive and warranted the characterization given it of "autocratic." In the second type of "leadership," the group leader exercised no "control" at all. He gave a little help when requested, otherwise he sat idly by and allowed the project to proceed without direction. This is the "laissez faire" or "let alone" policy. The third type of leadership was called democratic; perhaps cooperative is a better description. The leader here *participated with the children in planning the projects* and in carrying them out.

The major finding of this study should surprise no one, although apparently it has. Rigidly authoritative direction, even when it is benevolent, evokes not only some direct rebellion against the leader but also other and varied forms of "misbehavior": Quarreling and rudeness with each other, careless work and carelessness in the use of materials, slackness, lack of interest, general disorder. *In short, a great deal of what we call "naughtiness," misconduct or "problem*

* The careful investigations of Champney,³⁰ of Radke,³¹ and of Baldwin, Kalhorn, and Breeze³² confirm these findings. A recent survey by Vance,²³ under the writer's direction, reveals the great inconsistency of attitude shown by parents in this respect—probably indicating a slow evolution toward less authoritarian parental conduct.

behavior," even though it bears no obvious kinship to rebellion or resistance, *is caused by too much adult control.* Control which the child finds excessive leads to just the sort of outbreaks that require more control, hence more rebellion, then more drastic control, and so on in a vicious circle.

The highly significant long-continued study of individual children at the Fels Institute³² brings out the cumulative and beneficial effect of the democratic home atmosphere on personality development. In other investigations the early home background of young adults was studied. A much larger proportion of those from autocratic families manifested various sorts of distorted personality.³⁵

The Value of Authority.—It would be wrong to close this section without explicitly stating that the remedy for too much authority is not the withdrawal of authority. It is far too useful. By helping the parent or teacher to control the child's behavior, authority is the chief means to the maintenance of order. Authority also plays an important part in the teaching process by adding prestige to adult's suggestions and thereby strengthening his or her ability to motivate the children. But especially it is chiefly through the acceptance of authority that the whole mass of traditional ways which distinguish human societies from those of the brutes are transmitted from generation to generation.

We should also stress authority as something a child both craves and needs for wholesome development. In the experiment described above, "laissez faire" leadership—leadership which refused to assume authority—brought nearly as much misbehavior as did authoritarian leadership. It was cooperative or democratic leadership which brought out the best conduct. Where authoritarian leadership seeks to enforce external purposes and goals upon children, democratic leadership seeks, by integrating and harmonizing impulses which would otherwise be conflicting, to help them realize their own. Such authority gives direction and stability to the child's life as it does to that of society; and from such authority the child draws security.

SOME MAJOR ISSUES IN CHILD PSYCHOLOGY

Nature and Nurture.—One of the first questions asked about a newborn child is whether he looks like his father or his mother. As he begins to develop, fond parents (and grandparents) look eagerly for “family traits,” both physical and mental. Later still, abilities (and particularly disabilities) in school are attributed to heredity.

Such belief in innate characteristics, indeed, has been carried to great lengths. Criminologists were once wont to speak of an hereditary criminal type, and, although that notion has long been abandoned by all competent authorities, it remains a persisting “superstition” accepted, for example, by about 40 per cent of college students.³⁶ The Nazi doctrine that some “races” are innately superior is but another burgeoning of this notion of hereditary determination.

In our own land, as in others, politicians often seek to prevent action by solemnly intoning that “you can’t change human nature.” On the other hand, education, religion, law, custom, and social reform are all bent on changing our behavior, on creating new habits and ideals (or “a new heart within us”)—in short, are bent on altering, through environmental influences, that very “human nature” which is alleged to be so unchangeable. Sharp lines have thus been drawn on the issue of heredity versus environment, and important social decisions depend on how it is resolved.

At first blush one thinks of turning to biological genetics for help. Undeniably, the principles of genetics apply to behavior no less than to anatomy. But genetics, concerned as it is primarily with the *transmission* of traits, can throw little light on the question of the relative importance of heredity in comparison with environment.*

Faced with an anomaly—for example, buck teeth, or feeble-mindedness—the geneticist can demonstrate whether it is or is not biologically transmitted, may even work out the genetic mechanism.

* At least this is true of genetics as it has been; but a new and more dynamic genetics is emerging which sees the genes interacting with other cell tissues as well as with the environment.

The geneticist can be of little help, however, in determining what will happen if certain environmental pressures are applied to the child—literal pressure in the form of braces for the buck teeth, or figurative pressures in the form of training for the feebleminded. (The geneticist merely warns you that the boy with straightened buck teeth may therefore grow up to be attractive; may marry, and father children who, in a given percentage of cases, will in turn need their teeth straightened—that is, if they are to be attractive enough to continue the cycle, so essential to the prosperity of orthodontists.)

As the example of straightened buck teeth brings out, however, the issue of Nature *versus* Nurture is falsely drawn. After the orthodontist has done his work, the character of those teeth is clearly both inherited and acquired. Well, suppose that no orthodontia had been practiced. Would not the teeth still depend upon the kind of food the child had eaten as well as upon the child's inheritance? Can you conceive, indeed, of any structure of the body or of any behavior which is not influenced by the person's life history; or which is not, also, dependent for its character upon the genes with which the individual begins life? Development, in short, is always the result of the *interaction* of heredity and environmental influences. To summarize the matter in a paradox, a person's "hereditary traits" are what they are because of the environment in which he lives; his "acquired traits" are, no less truly, what they are because of his heredity.

If, however, we cannot meaningfully ask whether a trait is hereditary or acquired, can we not inquire about the relative importance of nature and nurture in giving rise to individual differences? Yes, we can ask; but the answer we get is not a simple one. There is no single formula which will cover all or even most cases. Haldane³⁷ points out that in modern Britain the trait of illiteracy is due in most cases to mental deficiency—that is, for the most part, to hereditary factors. But at an earlier day, the same trait of illiteracy was generally due simply to lack of opportunity. Thus in one environment the trait is largely due to heredity, in the other it is created by the environment itself. Before we can ask which has the greater effect

on group differences—nature or nurture—we must first specify the kind of environment and the kind of persons in the group; and then our conclusion can only be of the *average* effect. For other individuals or for other environments the relative contribution of nature and of nurture to the same trait may be quite different. “Thus we are led to say that heredity and environmental influences . . . do not constitute a single problem . . . but a family of problems, each with its own relatively complicated answer.”³⁸

No scientist today would dream, therefore, of stating the issue in terms of Nature *versus* Nurture. In our discussion of emotion and of authority, we have illustrated at many points the way in which the genetic factors and the environmental conspire together, as it were, rather than compete to determine our behavior. But a contrast between Nature and Nurture has managed to get itself embodied in the descriptive terms which we all use in speaking of behavior. Try as he may, therefore, to avoid a contrast he knows to be deceptive the child psychologist finds himself, in describing behavior, compelled to use words which suggest a false distinction between the hereditary and the acquired. We therefore still find echos of the nature-nurture controversy in many of the concrete problems of child psychology; but for the most part, the problem has taken a different turn.

Child Development.—The controversy has, for example, played a part in the Child Study movement—which in recent years has been rechristened Child Development. Even when the anti-heredity controversy in psychology was at its height in the 1920's, no one questioned that the child's physical frame takes shape under strong hereditary influences, both those of the human species at large and those of the particular family strain. Nor has it ever been questioned that life circumstances also influence this development. Here, then, we meet again the *interaction* of heredity and environment.

For the study of Child Development, however, this is no longer the major issue. Instead we turn to the intimate back-and-forth relation between “mental” activities or behavior, and “bodily” struc-

ture and functions.* Whatever be the underlying metaphysical interpretation, it is clear that "bodily" development is in part determined by prior "mental" activity, and vice versa. The child who is physically strong and energetic learns more easily the techniques of leadership, the child with a zest for play or a desire for excellence in sports may develop bulging muscles—or, as Gardner Murphy points out, may develop mucous colitis from trying too hard.³⁹

Instead, then, of asking whether the cause of a given behavior is Nature or Nurture, we seek identifiable specific conditions as an explanation of the child's present behavior and future development. Some of these conditions, as already indicated, are those of "bodily" structures and functions: Size, strength, health, energy-output, freedom from physical disability, motor coordinations and skills—the whole constituting the child's "physical excellence."† Other conditions which help to determine present behavior and the lines of future development are the established behavior patterns or "mental traits." Both together define the organism's present state of maturity; their joint influence is sometimes spoken of as that of maturation.‡

Will Child Development replace Child Psychology as a scientific discipline? The author believes not. With its two major emphases (the ontogenetic or "historical" approach in understanding children, and the stress upon "bodily" and "mental" functions as interacting), there can be no serious quarrel. Both have long been naturalized in Child Psychology. Child Development Institutes, where research in all aspects of child development is coordinated, of course, need no defense. But the division of labor which distinguishes different sciences is not abolished by bringing two or more of them together under a common roof, or a common name. The anatomist will con-

* Thus the basic notion of the new branch of medicine called psychosomatics is "old hat" in child psychology. Of course, there are many who say that in medicine also it is only a new name, or at most a new emphasis.

† The writer suggests that "total physical excellence" functions as an integrated whole, or unit-trait, at least for most children. Evidence for this trait unity must be sought, however, in the child's social behavior and status rather than directly in anthropometric measurements.

‡ Unfortunately there are other meanings for this term, similar but still distinct. The result is potentially so confusing that the present writer is inclined to abandon the term despite the undeniable convenience of a single word to point to the dependence of present behavior upon the whole previous course of development.

tinue—*has* continued—to work away at the problems of bodily structure, the psychologist at the problems of behavior, each using his own techniques and explanatory concepts. Cooperation, not amalgamation, will continue to be the road to further progress.*

The Normative Approach.—A major effort in child psychology has been directed at securing *norms* of growth and development, that is, in careful statements as to what may be expected at various ages, and of the range of individual and group deviations from the usual. Since development is a continuous process, we need to push back as far toward the very beginning as possible. Attempts have accordingly been made, not without success, to study the typical behavior of the foetus and the way in which it responds to changes in its environment, that is, to the mother's bodily states and activities.⁴¹ An even more considerable body of knowledge has been accumulated about the behavior of the "neonate," that is, of the infant during his first thirty days.⁴² Much attention has been given to the sequence in which various motor skills and coordinations develop during the first two years.⁴³ Despite a considerable variation in the *rate* of development in different infants, Shirley found astonishingly little variation in the *order* in which the several skills appear. Even the rate of development is affected very little by ordinary differences in experience, particularly in those behaviors which are the common property of the species. As proved particularly in the co-twin control experiments,⁴⁴ development may be speeded up temporarily by special training, but the gain is not maintained. Such precocious training is therefore wasteful, at best, and, by causing strain, may result in personality distortions of more or less enduring character. Any attempt to "force" a child's development is thus to be deplored.† *Beneath all the variation of behavior from infant to infant, a steady line of development common to all humans*

* For further discussion of the relation of Child Development to Child Psychology, see the symposium discussion by J. E. Anderson, H. E. Jones, and the present writer.⁴⁰

† But to avoid any possible misunderstanding on this point, let it be said explicitly that it is not *forcing* a child to *allow* him to proceed through school faster than his age mates if he is developing faster than they are. On this point, see the discussion on pp. 131-132.

is to be discerned. This is schematically set forth for the first five years in Fig. 12.

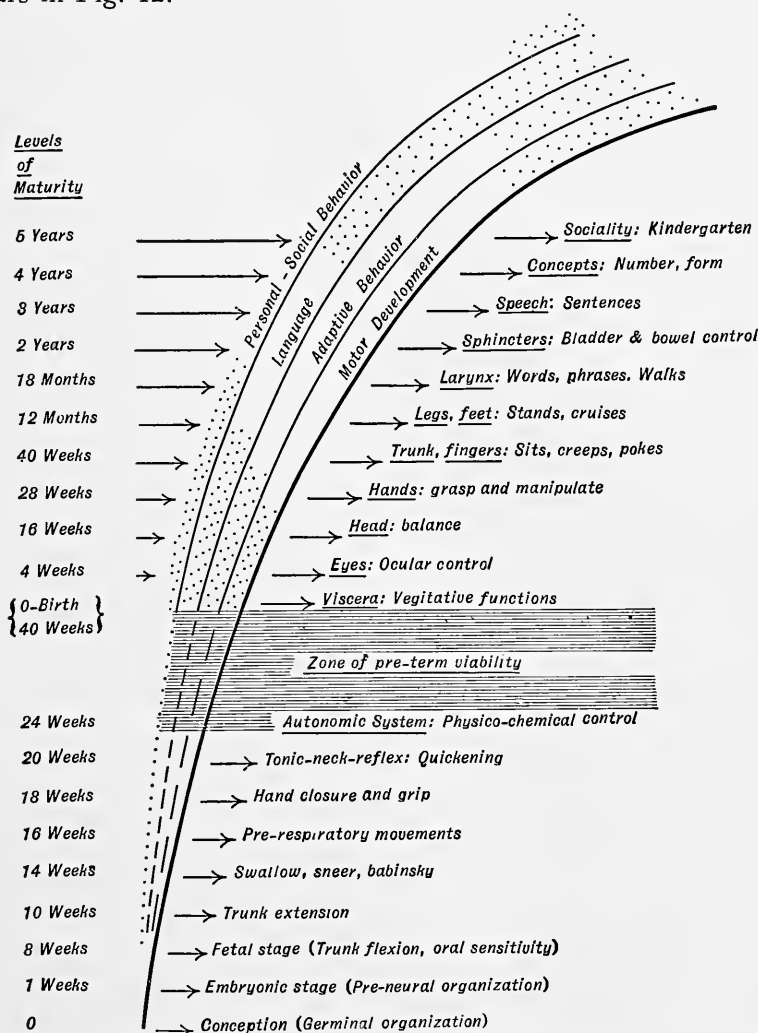


FIG 12.—ONTOGENETIC TRENDS AND SEQUENCES OF BEHAVIOR GROWTH. (From *Developmental Diagnosis: Normal and Abnormal Child Development*, by A. Gesell and C. S. Amatruda. New York: Paul B. Hoeber, Inc., 1941, p. 9.)

The typical age at which various behaviors appear is sufficiently stable to make possible rather elaborate schedules by which one can judge the relative rate at which a particular infant is progressing.

We may quote two illustrations from the "Normative Summaries" worked out at the Yale Clinic of Child Development.⁴⁵ (Quoted with permission from *The Psychology of Early Growth*, by Arnold Gesell, The Macmillan Company, New York, 1938.)

NORMATIVE BEHAVIOR: 8 WEEKS

HEAD CONTROL. *Supine*, the head is still predominantly rotated to the side. *Pulled-to-sitting*, the head lags only a little less than at 6 weeks. *Supported sitting*, the head sags but at times is held bobbingly erect or perhaps set forward. *Prone*, the head no longer rotates as the child is placed in position, but instead the midposition alignment is maintained. He erects his head, sometimes only momentarily, but at other times for a sustained interval. He lifts his head somewhat higher than at 6 weeks but still usually not beyond Zone 2. *Standing*, the head no longer sags forward but instead is held bobbingly erect or set forward.

ARM-HAND POSTURE. *Supine*, although the t-n-r arm posture is as prominent as at 6 weeks both arms are more likely to be flexed than they are at the earlier age. The fingers may be active when in contact with the body. *Prone*, the forearms are placed on the platform so that the child appears to be resting on them.

LEG-FOOT POSTURE. *Supine*, the infant now kicks; the extension of the legs, however, is brief. *Standing*, he supports at least a fraction of his weight. *Prone*, the legs are still flexed and adducted so that the infant tends to kneel.

BODY POSTURE AND PROGRESSION. *Prone*, the infant still rests on knees, abdomen, chest, and head. He flexes his legs, making crawling movements. As a result he may pivot slightly.

REGARD. The infant no longer stares at the window or wall, and his gaze is more alert than at 6 weeks; otherwise it is similar to that of the 6 weeks old infant.

PREHENSION. When the *rattle* is touched to the infant's hand, the hand no longer characteristically clenches; instead, the hand opens promptly and general activity increases. The rattle is now usually dropped immediately.

ADAPTATION. At the sound of the ringing *bell*, postural activity diminishes.

NORMATIVE BEHAVIOR: 28 WEEKS

HEAD CONTROL. In *supine*, the child may lift his head forward, apparently in an effort to sit. In *prone*, the head is tilted back to Zone 4.

ARM-HAND POSTURE. When *prone*, the infant may lift his arms, reaching forward, although they are still flexed.

LEG-FOOT POSTURE. *Supine*, the legs are no longer flexed and outwardly rotated but instead are extended and lifted from the platform. *Prone*, the legs are extended or semi-extended, flexed only at the knees, with abdomen and thigh resting on the platform. *Standing*, the infant supports a large fraction of his weight more than momentarily.

BODY POSTURE AND PROGRESSION. When *pulled-to-sitting* the infant assists the examiner by holding arms flexed and straining forward; *sitting*, the infant's body is momentarily erect, although he tends to lean forward.

REGARD. The infant now regards the *string* of the *dangling ring*; he also consistently regards the *pellet*.

PREHENSION. He approaches the *rattle* and *dangling ring* with one hand. Sitting in the chair before the table top he reaches for the *third cube* or for any cube which is beyond his reach; he approaches the *cup* with both hands, selecting the cup handle for grasp. He approaches the *pellet* promptly, opening and closing his hand, scratching at the pellet but usually without securing it. If he does grasp it, he drops it. As he approaches the *bell*, he inverts his hand adaptively, preparatory to grasping it. He grasps the *cube* with his thumb partially oppose to his fingers. He pushes at the *round block* when it is inserted in the *formboard* hole. The infant now retains the *rattle* and *dangling ring* for the entire period of observation. He also retains the *first cube* as the *second* is presented and after it is grasped. But when the *third cube* is presented he usually drops the two which he is holding. The *rattle*, *dangling ring*, *cube*, *spoon*, and *bell* are successfully transferred from one hand to the other.

MANIPULATION. The *cup* is now lifted from the table top. The tendency to carry objects to the mouth continues. The *first cube*, the *cup*, a cube of the *massed cubes* and even the infant's foot are usually mouthed. The *pellet* and a cube of the *second cube* and *third cube* situation are still manipulated on the table top. The *bell* is manipulated by holding it with fingers encircling the handle. One of the consecutive cubes and the bell are hit or banged against the table top.

Measurement in Child Psychology.—A total of 195 specific behavior items were found useful in making this developmental scale. In the full statement of the scale the responses which are counted "successes" are carefully described, and the situation is prescribed and *standardized*. On the other hand, we have to do with relatively "free" responses; we observe what the child does "naturally" in the situation.

Each of these two features finds further elaboration in the measurements used as the child moves up the ladder of years. In *tests* the element of standardization both of situation and of allowable response is further emphasized, with resulting gain in accuracy of measurement; and there enters in something akin to compulsion. The child is requested or expected to comply with a certain demand or to solve a problem. The effectiveness of his responses is taken as a measure of ability.*

In striving for standardization, however, something is lost. We deal with single situations; and any single situation may be inappropriate for a given individual. (Certain technical procedures minimize this difficulty but do not quite eliminate it.) To some degree, moreover, the element of naturalness or spontaneity is lost and this is important for those aspects of personality which are not entirely susceptible to being evoked upon demand. "Naturalness" is preserved, however, in *ratings*—which take many forms not always called by that name. Here the observation of free response in a single situation gives way to a report of the characteristic or typical behavior in a wide variety of relevant life situations. Much effort and many technical provisions are needed to insure accuracy and fidelity of such reports; but if the proper precautions are observed, ratings may yield measures of child behavior of high reliability.† Normative data based on ratings range from such careful schedules as the Vineland Scale of Social Maturity⁴⁶ to more generalized descriptions of "what to expect" of a child of a given age.⁴⁷

What to Measure.—A persistent problem facing us in measuring the course of development, whether we use tests or ratings, is that of what we are to measure. Inverting Thorndike's famous dictum that if a thing exists it can be measured, we too readily assume that if it can be measured, it exists. Well, we *can* measure the distance from the last rib on the right side diagonally downward to the lower edge of the left knee cap. Would anyone expect to find any rhyme

* Tests are discussed many other places in this volume. See particularly Chapters XIV and XVI.

† Projective "tests" are in many respects intermediate between true tests and ratings.

or reason in the development of such an artificial dimension? Even so apparently "natural" a dimension as standing height turns out to combine a number of structures which tend to grow at different rates under different conditions. (Anthropometrists generally use sitting height or some similar measurement on the ground that the components included are less miscellaneous, but even this is not a really "pure" measurement.)

When we turn to behavior, the problem is even more complex. Is intelligence, for example, one trait or merely an average of a number of traits which develop separately, each at its own rate? Is there a single personal quality of honesty to be measured, or is this just an abstract noun derived from many actual behaviors which indeed can be called honest by the outside observer, but which have little relationship to each other in the life pattern of the individual.

A particular child, for example, may scrupulously observe "mine and thine" in relations with a comrade, but that is because he loves his friend. He may not swipe money from his parents, but that is because he is afraid of them. The honest behavior in such a case is not referable to an underlying trait of "honesty," and the "dimension" of honesty for this child would be as unreal and artificial as the physical dimension from right rib to left knee cap referred to above.

You can make the measurements all right (that is, by tabulating the frequency of honest behavior under varied circumstances), but the result is virtually meaningless for the study of development since the varied elements which go into the measurement change independently of each other. Suppose that the boy falls out with his chum; a measure of his "honesty" three months later will show honesty declining. Let the friendship be revived and the "honesty" increases again. Of course, what we have here is not a measure of the development of honesty with age but the waning and waxing of a friendship.

We have set this forth as an hypothetical case but the extended research of the Character Education Inquiry⁴⁸ indicates that for honesty something very like this is the rule with young children. They do not have one "honesty" but rather many "honesties," hav-

ing little inner connection with each other. Only gradually, under social pressure and instruction, does the child come to recognize the common quality of the different honesties. Gradually he builds up an ideal of honesty and develops a certain degree of consistency in abiding thereby. (Here, at last, we have a trait which is really "acquired!" But even so, inherited elements play a part.)

Findings such as these are important both for parent and teacher and for the professional student of development. We must not expect to find in young children traits which require long experience for their acquisition. "The child is not a little man"; it is therefore necessary to discover the behavior dimensions or traits which are appropriate for children in their various stages of development. There is, for example, much reason to doubt that what we call intelligence in the infant is qualitatively the same thing as what we call intelligence in childhood. Such seems to be the explanation, at any rate, of the fact that, except in cases of marked deficiency, tests of mental ability in infancy yield little or no prediction of later intellectual development.⁴⁹

The same problem in another form arises from the fact that under the impact of experience, different persons may develop almost completely different behavior patterns or traits. In a society where "mine and thine" did not exist, where anyone might freely take and use anything not physically in the possession of someone else, "honesty" would be, not so much deficient, as irrelevant. To take or not to take something one wanted would be decided on other grounds, such as whether it was kind—and doubtless some persons would fall from virtue in that society even as in ours. The point is, however, that one would adhere to or fall from a different virtue; the virtue or trait of honesty just would have no reason to exist under such conditions.

It may seem that this highly theoretical discussion has wandered from the topic of child psychology. Not so. There are family environments in our own land in which honesty as understood by our society is almost as nonexistent as in the hypothetical society just described. Is it not obvious that the course of development

in "honesty" for such children is not to be plotted in the same terms as for children from more normal homes?

Indeed the problem of normative measurement may begin to look completely insoluble. Measurement, we have been implying, requires that the trait measured be made up in different children of behaviors which are homogeneous—that is, which are similar and go together. But traits depend on experience, and the experiences of different children are never wholly the same, often are radically different. How then can their traits be homogeneous?

The solution, although it imposes limitations on our conclusions, is not really very difficult. There is a great volume of experience shared by all who live in a given culture, indeed by all members of the species. These experiences, moreover, affect organisms which are substantially alike in innumerable ways. From the interaction of common experience with common human nature we get the development of traits common to all human beings, or, of traits common to all in a culture. Always, however, there are interesting individual variations. It is for the assessment of these variations that we need to set up norms or statements of the usual in development.*

Cautions in the Use of Norms.—It is almost as difficult to evaluate as it would be to summarize briefly the huge mass of normative data that have been carefully collected. No one can question the need or the value of such facts; yet if they are uncritically interpreted, they can be very misleading. As soon as we set a norm of behavior it is fatally easy to interpret any deviation as "abnormal." Only in a purely etymological sense of the term need this be the case. Norms represent the usual behavior *under certain usual conditions*; but there may be deviation from usual conditions, present or past, without leading to anything pathological. Moreover, as the familiar example of growth in height should teach us, there are individual and familial differences to be reckoned with. The child of very

* The problem of what to measure is so basic that it is treated by implication in every chapter in this volume. For more extended treatment, the advanced student may refer to Allport's *Personality* and to Cattell's *Description and Measurement of Personality*.⁵⁰ Other problems of method in child psychology are interestingly summarized by Anderson.⁵¹

short parents is by no means "abnormal" if his height falls short of the norms so confidently set forth in height-age tables. For reasons which will be taken up in the next section, the range of behaviors which may be "reasonably expected"—that is, as falling within the norm—is very great. In our commonsense moments, we are not surprised that children from homes of restricted "culture" use poor grammar or are unfamiliar with certain courtesies. Nor do we—usually—characterize them as abnormal. They are simply children who need more training.

More training, at least, if they are to move in circles where the better grammar or the certain courtesies are valued and useful. (There are, we should remember, certain groups in which they would be definite handicaps.) Norms are based upon the usual environment of the group; and they find their significance only in terms of the relation of the individual to the group—to his own group, moreover, however that may be defined, either by him, or for him by society. The norm of fourth-grade arithmetic may be of almost tragic significance for the child who is struggling to keep up with his comrades in that grade; if it is possible, he should be helped to meet these norms. The norm of competitive team play is important for a ten- or eleven-year-old white American; it is wholly unimportant for the Hopi Indian child, at least as long as he lives among his own people. (If, however, the Hopi is to be assimilated into the main stream of American life, perhaps he must learn something of the eat-or-be-eaten competitiveness which is so large a part of our society.)

The norm of his own group must not, however, be made into a Procrustean bed to which the hapless child must be fitted, either by "stretching" or by "cutting down." The "group to which he belongs" is not eternally predetermined. A slow-learning child can be moved into a group with a norm more like his own. Or the norm of the group can be changed. It is, for example, unnecessary to accept without challenge the unrestrained competitiveness of the fifth grade; we do not accept the "normal" amount of dishonesty in five-year-olds; we attempt to educate them.

If our norms are thus decidedly relative, it remains to add that many of them are deeply rooted in the prevailing culture, and that such cultures change slowly. Society imposes many demands—that is, norms—upon the child and imposes, in one way or another, penalties, or at least restrictions, upon those who do not meet these demands. When a child departs too conspicuously from such norms, special action needs to be taken by the adults responsible for his development to insure wholesome adjustment. Developmental norms or standards, utilized, not as a means of stigmatizing the deviate, but as suggesting appropriate remedial measures, have thus an important role in child care and education.

The Dynamic Approach.—Normative data are useful also when we turn to the dynamics of child behavior—to a study of cause-and-effect relationships. Two major but overlapping interests may be seen at work in this aspect of the field. First, when we study children we may be looking for the general principles or laws of all behavior. Secondly, we may seek the explanation of specific concrete actions: In individual children; in children of different ages; or in adults, when adult behavior is seen as rooted in childhood.

There is no doubt that the structure of child behavior is often simpler than adult behavior, hence more revelatory of behavior laws. On the other hand, the investigator sometimes discovers that he has merely exchanged one kind of complexity for another. The simplicity of child behavior is a somewhat overrated advantage for the study of general behavior laws.

More important is the opportunity to study behavior organization in the process of formation. Consider language. It is by no means clear that the speech behavior of the child is really simpler; much adult speaking is so highly habituated, so mechanized, as to be, psychologically considered, practically a reflex, whereas the first beginnings of speech in the infant display an exquisite complexity. Obviously, moreover, the greater cooperativeness of adults makes investigation easier in many ways. The advantage, then, to be gained from observing language in the child is that we can hope to detect the way the complex structure of language behavior evolves

in the life history of the individual.* We have learned much, and may hope to learn much more, about the function of language in general from a study of children's language.

Parallel advantages for general psychology are found in the study of other forms of child and infant behavior. Indeed most of the investigations of infants, particularly of the newborn, are concerned, not with infants as such, but with infant behavior as displaying the principles of development which prevail throughout man's life.

Child Guidance.—Popular interest in child psychology is apt to be more concrete and specific. Why, it asks, is Betsy so much shyer than her sister? Why is baby Harold usually cross on Monday? Why does Billy sometimes show so much maturity in his play, at other times regress to a babyish mode? Why does Alice show no interest in second grade arithmetic? (And what can we do about it?) Why is Sam more intelligent than his brother, Will? Does spanking a child for impudence do any good? And so on far into the night. A mature child psychology must be prepared to deal with such issues, even if it sometimes declines to answer the question in its original form.

The brief systematic discussions of emotion and of authority with which we began this chapter have many indications of the way in which such issues are met. It is clear that we appeal not only to many facts but to interpretations of facts—that is, theories. Some of these theories have explicit rooting in experiment. Others come from statistical studies of real life situations. Much is simply the careful and critical exposition of the significance of facts known to all. And finally many of the interpretations are derived from clinical studies and case histories, particularly those made under the influence of the various psychoanalytical systems which take their origin from Freud.

Psychoanalysis and Child Psychology.—A brief statement of the

* Not, be it noted, that we may learn how language has evolved in the history of mankind. The effort to trace parallels between the development of the species and the development of the individual has been repeatedly proved misleading for psychology.

relation of psychoanalysis to child psychology is therefore in order. We are not concerned with psychoanalysis as a method of diagnosis and treatment of neurosis, nor even with the theory of adult personality it depicts, but specifically with the light it throws on child behavior.

As is well known, the chief reliance of psychoanalysis is the interpretation of memories of childhood events, with dreams constituting a special kind of memory. Now memories are notably unreliable; and even the analytical psychologists (as the followers of Freud are called) recognize that their techniques do not succeed in evoking all relevant memories. Moreover, the psychoanalytic techniques for probing the patient's memory, while ingenious, are wide open to the effect of suggestion—and the analyst is dealing with a person in trouble—a neurotic. Finally, there is excellent reason to doubt that all experiences, even all important experiences, are retained in memory. Others have utilized memories of childhood for suggestive hypotheses but it is doubtful that, since the early days of child-study questionnaires, anyone has used them with so little regard for scientific controls to insure validity as have the analysts.

An even more basic objection to psychoanalytic deductions is shared by all purely clinical studies—namely, that they rest upon an improper sample of the persons to be studied. Since we can never observe everything, every scientific investigation seeks to isolate a *representative* sample. Now obviously we cannot safely assume that the childhood experiences of those who seek help in a clinic are representative of all childhood experiences. Nor can we assume that these experiences are characteristic of just those needing help unless we have parallel investigations of carefully chosen control groups of “normal” persons.

In short, we cannot tell whether the array of childhood experiences revealed by psychoanalysis (or even by objective case histories) is typical of all children; or is peculiar to those who later become neurotic; or is just plain accidental. Paradoxical as it may sound, to study *only* the abnormal is to fail to discover just what makes a person abnormal. We must take our departure from a really representative sample if our conclusions are to have validity. No

psychoanalytic investigation to date has even approximated this criterion.⁵²

If we thus reject psychoanalysis as a source of evidence, we cannot neglect it as a source of important concepts—to be verified, or modified and verified, by more soundly based research. The total picture of childhood depicted by psychoanalysis, is found by objective observers to be distorted and unreal. Yet many of the details of theory are illuminating.

Thus few child psychologists accept the Freudian view that every child passes through the Oedipus stage where he feels sexual passion for the parent of opposite sex; but virtually all psychologists today recognize that the affectional relations of the child with his parents are of crucial importance for the total development of his later love life. The analytic concepts of conflict, transference, fixation, to mention but a few, have proved their usefulness in child psychology. They find their place, with other hypotheses, in a program of experimentation and empirical research.

The Present Trend in Child Psychology.—It will not be expected that in one chapter all the facts and theories of child psychology will be set forth. One of the most striking omissions is our failure to deal with intelligence in children, for this has been one of the most actively cultivated areas in the field of child psychology. Some of the findings are introduced incidentally in this chapter, others are set forth elsewhere in this book, particularly in the chapters on Educational Psychology, Clinical Psychology, and on Individual Differences. Our neglect, however, also represents a phase in the growth of child psychology.

Twenty years of fairly active experimentation with tests of children's intelligence had preceded the publication in America of the first complete "Scale"—Goddard's "Revision of the Binet Scale" in 1911—but it had attracted little interest. There followed, however, a period of very rapid growth during which the public might have been justified in thinking that child psychology was nothing but mental testing. The boom of course was followed by recession. While no child psychologist today would dream of omitting a con-

sideration of intelligence, whether in experiments or in dealing with an individual child, seldom is intelligence the central issue.

Now a new phase has made its appearance. The multiple-factor study of mental tests may shortly lead to a significant change in our whole conception of intelligence, and in our use of tests. If so, this topic will again assume prominence; for intellectual development must always remain of prime importance both in childhood and later.

The Variety of Problems.—What, then, are the central issues of today? They are so scattered that it would be foolhardy to list them. Some indication of the range of work in child psychology may be gained if we cite a random sample of the topics dealt with during the years 1937-47 in the published papers of one of the larger institutes for the study of child development.⁵³ Children's growth toward independence; growth and maturity in language; children's written completions of unfinished stories; determining and enumerating adjectives in children's speech; development of number concepts in the preschool child; variability of I.Q. (Stanford 1937) at successive age levels; mental development of nursery-school children compared with that of nonnursery school children; retaliative behavior in young children; institutional adjustment of delinquent boys; behavior problems and the depression; effects of praise and competition on persistence.

The bibliographies listed in the *Manual of Child Psychology* (edited by L. Carmichael) are an even more impressive testimony of the range and the vitality of activity in this field.

Methods.—If there is no trend in the topics dealt with, there is a definite trend in methods and general outlook. The discussions of emotion and of authority in this chapter represent the present transitional stage; there is a respectable amount of experimental data, but there is also reliance upon other empirical findings which are somewhat less conclusive. While we hope—and believe—that those who accept what we have set forth will be led in the right general direction, we are sure that in ten years a different treatment

will be in order. More and more the speculations and hypotheses which have grown out of practical attempts to guide the young are being subjected to experimental study. From experiments, moreover, will come not merely verification and refutation of theories, but a restatement of theories and problems in quite new forms.

It is impossible, however, in child psychology to deny practical interests; someone simply must deal with the urgent psychological problems involved in bringing up children. The newer experimental approach, already exemplified in the experiment on kinds of leadership quoted above,³⁴ will work with real and practical problems with children in natural life situations. Nowhere else will general theory and practical application be more happily married than in child psychology.

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CHAPTER V

EDUCATIONAL PSYCHOLOGY

By HORACE B. ENGLISH, *The Ohio State University*

Educational Psychology at First the Handmaiden of Educational Reform.—From the beginning of the modern period there has been a close connection between psychology and education. The early educational reformers appealed to psychological principles in support of their proposals—as indeed they do today. We must note, however, that all too often the appeal was to a psychology specially tailored to fit the theory. Strongly convinced that they had a vast improvement to make in education, Komensky, Pestalozzi, Rousseau, and other great prophets of educational advance looked about them for the facts that would support their beloved projects.

And here became manifest the almost fatal limitation of all arm-chair theorizing—one can find support for almost any theory if one is allowed to select the facts. If, for example, one sincerely believes in the unspoiled innocence of the child, as did Rousseau, one experiences no difficulty in gathering instances that confirm his faith. Those who believe in original sin and the depravity of the natural man are equally untroubled for evidence. We find what we hope to find.

None the less, the reformers' appeal to the facts of child nature and learning was healthy. Bias could not wholly conceal the facts even when the facts worked against their theories. Little by little a truly impartial psychology of childhood began to emerge. Partly under the impetus provided by the doctrine of evolution, people began to study children not merely to provide the underpinning of an educational theory, but in order to learn what children are really like.

The Application of General Psychology to Education.—Meanwhile, an independent science of psychology was gradually

developing out of the matrix of philosophy. As many as a hundred years ago, Herbart attempted to draw from this new science whatever principles seemed likely to serve the schools. Here for the first time was an attempt—at least the first systematic attempt—to get the psychological facts and principles first and then from them derive the educational application, instead of following the reverse direction by seeking to justify a program already chosen, by the appeal to psychology.*

Herbart's attempt was brilliantly successful. Few except the special student realize how much, even today, the framework of educational practice owes him. And with the growth of psychology during the intervening century, education has continued to draw upon it for sustenance.

There has thus grown up a considerable body of facts and principles, drawn from the several fields of psychology, which seem to have direct bearing on school practice. Many scholars still think of educational psychology as such a collection of borrowings from other branches of the science.

The Direct Psychological Attack on Educational Problems.—But it is much more than this. The educational psychologist of today does not wait until useful principles emerge from studies pursued for other ends. Instead, he investigates independently the psychological aspects of all educational problems. In doing so, he does indeed bring to bear any principles and any methods of investigation elaborated elsewhere in the science of psychology if these bid fair to serve his purpose, but he does not hesitate to modify them or to develop new ones as needed. A very real contribution to psychological methods as well as important facts and conclusions have resulted from this vigorous, direct attack upon the practical problems of education.

Consider the origin of intelligence tests. Early in the century the Paris school system became aware of a practical problem of some importance: Were the laggards in school unable to learn, or merely

* Great psychologist that he was (and great educator, also), Herbart none the less failed to realize the extent to which the school was a magnificent laboratory in which to test the truth or error of the psychology.

unwilling, or badly taught? They turned to a celebrated French psychologist, Alfred Binet. Could he devise a way to tell? He could and did.

Now it is true that for some years Binet had been studying the higher thought processes and that the Binet scale shows the clear influence of the earlier experiments. And of course Binet's approach was through and through psychological. Yet essentially, intelligence testing began with a direct attempt to solve an educational problem. Today by far the greatest part of educational psychology does not consist in borrowings from general psychology but of principles and facts independently developed in this practical but thoroughly scientific fashion. The result is a discipline, less tidy and systematic, perhaps, than might be desired, but one which is thoroughly useful and functional for the teacher.*

The Expanding Field of Education.—The orientation of educational psychology toward practical educational issues imposes one important, although temporary, limitation upon it. It has hitherto been largely concerned with formal schooling and with children—for it was so in the main that we conceived education. But a broader conception of education is winning its way. The out-of-school life of the child is being recognized as a part of his education more important in most respects than the comparatively few hours spent in class. Our treatment of educational psychology will attempt to reflect this new emphasis.

In a still more important direction, however, our conception of education has recently been expanding. A truly adult education is beginning to emerge. No longer is education considered a matter of the school years and of formal instruction. We are learning to think of education as all of those deliberate efforts to alter the individual to the end of his own greater happiness and of his usefulness to

* The same evolution seems to be taking place in other parts of applied psychology. The earlier dependence of applied psychology upon *general* theory is greatly lessened; the applied fields tend to develop theories of their own appropriate to the facts with which they have to deal. The relationship between general and applied psychology will, to be sure, always remain intimate, but the day is not far distant, apparently, when a major task of general psychology will be to correlate and assimilate the facts discovered in the several applied fields.

society. Thus conceived, agencies, hitherto unrecognized as part of education must be accepted as such.

Thus the library has for decades been recognized as an important instrumentality for public enlightenment and the diffusion of "Culture." We need, however, to see its function more broadly in terms of the human needs which may be satisfied in a library, the growth in personality which may be subserved through its instrumentality—and we need, of course, research designed to reveal how this can best be accomplished.

That the public library is fully cognizant of its opportunity and its responsibility in fostering adult learning and growth is indicated by the rapid development of the readers' advisory service. Many large libraries make definite provision for meeting the educational needs of individual readers by a series of personal consultations carried on over an extended period by specially equipped personnel. Leaders such as Alvin Johnson are now advancing the thesis that the true function of the public library in a democracy should be that of a people's university, broadly conceived to include all activities essential to a full-bodied program of adult education. Playgrounds, recreation "field houses," and other similar institutions must also be seen as integral parts of public education.

Correlative with the changed outlook on education must go a new orientation in educational psychology. We must give consideration to the psychological development of the adult years and must place even more emphasis on the nonintellectual forms of development. A promising beginning has been made in this field and significant findings have already appeared.

Today, however, it cannot be denied that the vast majority of research studies in educational psychology concern the school years and deal with education conceived primarily in terms of schooling. Fortunately, many of the principles adduced from a study of children seem to apply fairly well to adults, although it is unsafe to assume such application without empirical verifications. Since we desire to keep close to verifiable fact, we shall perforce give major emphasis to the educational psychology of the young.

Even this, however, is of course far too ambitious a project for one chapter. We have preferred in what follows to deal with

certain sample topics fully enough that the reader may see a little of the outlook of educational psychology—or at least of one educational psychologist. No attempt at all is made to survey the field as a whole.

CHILD NATURE IN RELATION TO THE EDUCATION PROCESS

Suppose one is a teacher facing for the first time a class of boys and girls. What would one *most* seek to know? Surely one would not ask the fairy godmother first for knowledge of the subject matter to be imparted nor yet of the methods of teaching it. Neither would one seek first a more consistent philosophy of education, important as that may be. Surely first of all, one would seek to know more about the twenty or thirty or fifty young individuals who sit more or less restless in their appointed places.

Some doubt has been raised as to whether such understanding of the individual can come from scientific psychology. That which is unique necessarily eludes scientific study, we are told, yet it is the unique person who is, without question, the true object of education. Psychology may deal with individual differences but the *individual* remains the forgotten man—or child.

Every Individual Is Unique.—Even if this is admitted—and there are influential psychologists who refuse to admit it—it would still remain true that the unique person can only be understood as a member of a group of other individuals whom he resembles and from whom he differs in myriad ways. A scientific study of individual differences may not be able to grasp the inner secret of individuality; but it is at least a solid basis for understanding the individual, and a necessary basis.

We shall, in what follows, therefore, proceed by analysis of different qualities and processes. Thus in the account of development which immediately follows, we shall consider various of its aspects in separate sections. Yet because these qualities and processes are essentially those of a single person, they are interrelated in complex ways. It must, indeed, never be forgotten that growth in height or in numerical skills or in emotional maturity or in character are

interrelated aspects of the developing person who is Jimmie Randolph or Betty Bruce.

Physical Growth and Development.—This is immediately apparent when we consider physical growth, for this is of interest to the psychologist as such only in its bearings on other aspects. But the “only” here may be said to include practically the whole of educational psychology. There is no aspect of a child’s behavior which is not influenced greatly by the child’s size and strength, and by the attitudes which children take toward this kind of growth.

As Pressey and Robinson put it, “for the child, the fact that he is constantly growing is not simply a fact; it is an experience, presenting to him very difficult problems.”¹

The Case of the Oversized Child.—At seven K. M. was as big as most girls of ten and looked the part. When she played with the neighbors’ baby they expected her to show the discretion of her apparent age and expressed disgruntled surprise that a “big girl like you should show such poor judgment.” Throughout her childhood she was constantly being held to the standards of her size rather than of her social or intellectual maturity. She grew into a petulant young woman who had a sense of always being picked on.

With puberty the problem changed but not for the better. Since she was a good half-head taller than any of her classmates in the rather small high school she attended, to dance with her was literally difficult, and to associate with her socially was for most boys of her age humiliating. During her junior and senior years, she began to associate with college men. This again put upon her the necessity for adjusting to problems beyond her level of social maturity.

Because the men she was associating with were just a little ashamed of “cradle snatching” and also because their intellectual interests were in advance of hers, the relationship was restricted even more than usual to the sole basis of the physical. As a result, K was both bewildered and overstimulated. Only very careful treatment kept her from a career of sex delinquency. Today she looks back to a childhood and adolescence in which she was deprived of experiences necessary for a well-rounded development—deprived of these

experiences as truly by her unusual size as another might be by poverty, an inadequate home, or disease.

The Effects of Illness and Disease.—The mention of disease may lead us to consider how this also may be related to behavior. That a seriously sick child cannot learn as well as a normal child is perhaps not so axiomatic as it seems; there are too many examples of invalids who have achieved great things, in and out of school. But the effect of illness upon conduct rather than capacity is surely obvious. Nervousness, crankiness and ill-temper, loss of self-control, and a host of other behavior problems are often traceable directly to ill-health. Hardy's study, however, warns us of the complexity of the problem.² She found, as might be expected, that children with an excessive amount of illness were more often behavior problems, although the difference was not so great as might have been anticipated. But, short of such extreme cases, even a great deal of illness in childhood does not seem to be correlated very highly with maladjustment in adolescence or early maturity.*

Even without this study, however, we might realize the complexity of the relation when we recall that one and the same illness will make one child fretful and another resigned and "easy to deal with." The effect of health on conduct clearly depends on the co-action of other experiences and on the previous personality of the invalid.

The Effects of Sensory Defect.—A single illustration from the field of sensory defect will help further to make clear the interrelation of physical development with other aspects of growth. Consider the child with severe myopia or near-sightedness. At school, reading is likely to be retarded. He is often unable to see what the teacher puts on the board and is thus retarded in learning. His visual deficiency has generally kept him from exercising his curiosity upon visual forms, hence even when he can see them, he is apt to pay little heed to the differences between *b* and *d* or *p* and *q* or *m* and *n*. (We adults are apt to forget how minor and how intrinsically uninteresting

* In passing one may notice that Dr. Hardy found that recollections and school attendance records are but poor guides to the amount of actual illness.

the shapes of letters are to any child, let alone to the handicapped.) To make the precise discriminations required for reading takes much more time for those with very poor vision—and this is particularly true in the earlier years when that form of half-guessing called perceptual fill-in has not been learned.

Now reading, being *the* instrument of intellectual progress in school—as doubtless it will continue to be despite the inroads of the “activity movement”—the next effect of poor eyesight we must take into account is a general lowering of achievement in academic subjects.

The statistics which from time to time purport to show that there is no relation between visual deficiency and school marks are unconvincing when critically examined. Evidence that there is almost no general correlation between excellence of vision and marks is irrelevant: There may be no substantial difference between excellent eyes and merely fairly good eyes, so far as ordinary academic work is concerned; drastically poor eyes are another matter. As we shall presently note, moreover, those with poor eyesight are not infrequently thrown back upon reading as a substitute for other play, and eventually, as a sort of compensation, some of them attain higher academic levels. But in the earlier school years the depressing effect of very poor vision is clearly manifest.

We have begun this survey of the effects of poor eyes in typical schoolmasterish fashion by considering “school work.” But the child’s personality has been developing for six years before he presents himself at the door of the school. What has his defect been doing to this development? And what does it do through the school years?

Consider first the necessity of caution in movement. Parental teaching and a school of literal hard knocks early teach the half-blind child that the impetuous, carefree romping of his comrades is for him full of danger. Glasses, though they help him to see, give another reason for an unchildlike wariness. Play is restricted in scope and especially in success. The give-and-take of childhood play, the habit of successful and happy competition are held to a minimum. Then, too, the social status of one who cannot play well is seriously impaired. From this comes loss of self-confi-

dence and initiative, and therewith a further impairment in social acceptability.

A more subtle effect concerns education in emotional language. It is well established that most of our emotional expressions are conventional; both to express and to understand the expressions of others in facial and postural gestures is a thing which must be learned. Learned, of course, by seeing the subtle play of expression in the faces and bodies of those about us. The blind and the near-blind are shut off from observing these fleeting responses of their associates. If, for example, their talk is tedious, they are oblivious to the warning signals of boredom in their listeners. Nor do they so easily learn by imitation to convey in face and voice the finer shadings of emotional expression. Once more, social acceptability is restricted.

All of these influences tend in the direction of what is called the introverted personality. They tend to shut the handicapped out of the social life of childhood, back upon himself and his own inner resources. And even though one reads but slowly, the *book* then becomes the easiest source of experience and delight; for here are no complicated problems of eye-motor adjustment to unseen flying missiles or obstacles, no comrades who jeer one's failure to "hit it on the nose." Play with others being difficult and all too often humiliatingly unsatisfactory, retreat to the inner world of fantasy and day-dreams is an ever-present temptation.³

Now none of this, of course, is an inevitable result of severe visual handicap. Other influences may counterbalance or prevail over the push toward an unhealthy kind of introversion which the handicap imposes.

But these counter influences must not be left to chance. It is too much to expect the visually handicapped child of eight to find adequate play substitutes for baseball, too much to expect him to collect the playfellows who will share his own more restricted play interests and skills. Parents and teachers must be alert to discover and make possible for the child adequate outlets—and must do this, if possible, without the appearance of special treatment.

We have treated the case of a single sensory defect at this length, not only because of its intrinsic interest, but because it brings out a number of important general principles. And specifically what we

have just stated is the line of attack upon any kind of social maladjustment. Social contacts *can* be fostered, a healthy play life *can* be encouraged and made possible; but only by adults who clearly see the problem. The child who cannot make friends easily, by the very definition of the problem, faces difficulties beyond his unaided power to surmount—this is true no matter whether his friendlessness is due to physical handicap, or to shyness, to poverty, or to any other cause. If he is to make progress, the social situation must be simplified for him somehow, or otherwise made easier, until a level is reached where he can successfully cope with his problem. This, as we shall see in a later section, is the essence of all teaching; and social adjustment, no less than geography, presents a problem of teaching.

Factors in Leadership.—The positive side of the medal is no less important if we are to understand child growth. In the life of a child, large-muscle play is so predominant that size, weight, and strength largely determine social status and leadership.

One September morning the writer was watching a third-grade group at play. An enterprising youngster improvised a typical eight-year-old game. Folding his arms across his chest, he would sneak up behind a playfellow and give him a stiff shove to the sing-song chant: "He who crosses my path gets himself bumped." The game was gradually taken up by boy after boy till only one was left. This lad was spun helplessly around again and again with mounting pain and dismay. At last, however, he began to understand the game. Then, indeed, the picture changed. To judge by his behavior, he was a rather dull boy, but he was bigger and heavier than any of the others. When he bumped, he bumped solidly. In a very short time, he had assumed a position of unquestioned dominance in the play of the group, and with this dominance a measure of respect. Height and weight had prevailed over alertness as a determiner of social position.

The effects, moreover, of social leadership in childhood play are not lost. Leadership seems compounded in about equal parts of the desire to lead and a knowledge of the necessary techniques. Both are gained more readily by the child with a high size-energy-health index, as is brought out in Cabot's studies of the relation between physique

and personality trends.⁴ The child who is excluded from leadership in childhood by a frail physique may compensate for a late start, but one may doubt whether his leadership is ever so serene and wholly "natural" a performance as it is in the case of those who learned to lead in the games of childhood.

One more reminder of the complex interrelations with which we are dealing. A child small for his age may play predominantly with younger children and may lead or even tyrannize over them by virtue of his greater intellectual maturity. And all these and similar considerations cut across considerations of environmental opportunity.

These few concrete examples must suffice to illustrate something of the nature of the relationship between physical development and the development of behavior and personality. The examples are admittedly somewhat extreme, yet, paradoxically, they bring out clearly the general principles which pervade the whole topic. They show how unevenness of development imposes strain upon the growing organism. They point to the critical influence of physical status on social acceptability and social development. And, most important, they indicate the possibility of preventing, by taking thought, many or even most of the untoward effects of uneven development.

Intellectual Development.—We have begun our survey of development with the physical aspects because childhood is a time of gross bodily activity and because physical play is the school of personality. Yet it may be questioned whether in the long run these obvious effects of physical status are more important than those which depend upon differences in intelligence. (In any case, we must remember that the two influences interlock.) Especially in adult years, intelligence not only very largely influences success; it very largely determines a whole way of life. In the school years, also, it is a more potent determiner of the child's whole development than is commonly realized.

That it is extremely important in considering academic success almost goes without saying, but there are other and in the end probably more significant correlates of intelligence.

The Case of the Overly Bright Child.—Marian was the youngest of five children. Her intelligence was such as is attained by only one in about ten thousand—not miraculous at all, but distinctly high. Long before she went to school she practically taught herself to read—with a little help from her older sister. Entering school at six, she at once became a serious social problem. Her superiority over the others in the class was evident to her teacher, her classmates, and herself. She was impatient with those who could not do things as well as she and constantly sought permission to recite or otherwise take over the performance at the first sign of others stumbling. Despite tactful handling by the teacher, the other pupils came to resent her “butting in all the time.” Conscious of her own rectitude and superiority, Marian reacted by alternate sulkiness and rather spiteful attempts to show the other children up. The suggestion that she be transferred to the second grade met the astonishing objection from the school that this might hinder her social development! It ought surely to have been obvious that her social development was being seriously distorted where she was; it was primarily to obviate this that assignment to a higher grade was sought. The event justified the prognosis. Jumped to the second grade, Marian’s conduct became more in accord with what was to be expected from her excellent home. Although she still led the class in academic studies, she found it impossible to lord it over the somewhat older and bigger children; and to maintain her cherished superiority she was compelled to adopt more tactful manners.

Ralph’s case is quite parallel. The son of a high school teacher, he was brought to the Psychological Clinic as a behavior problem. At life age $10\frac{1}{2}$ he was apparently already a little bit advanced in the sixth grade. But on the Stanford-Binet test (Form L) he obtained a score equal to that of the average child of 15. On a performance scale (Grace Arthur), he did even better, indicating that his intellectual development was not of a purely verbal type. On a test of academic proficiency he reached the tenth-grade level. No wonder the boy found school deadly dull! No wonder that he thought people did not appreciate him as they ought (they didn’t!), that he indulged in fantasies of running away, that he made no friends in this ele-

mentary school to which he had just transferred from another town.* No amount of extra promotion would actually solve this problem, of course. Ralph would be equally maladjusted at $10\frac{1}{2}$ in either sixth or tenth grade. But promotion to the junior high school with its more varied and flexible program gave greater scope to his intellectual gifts and did much to help his morale. The full story of Ralph, however, cannot be told here. Although his superior intelligence and the failure to give it opportunity to function at school were basic, around this basic difficulty a number of other factors were grouped. Indeed it may be put down as an almost invariable fact that psychological troubles do not come singly.

Is Intelligence Inherited or Acquired?—This question is a hardy perennial which bobs up in every discussion of the subject. The only sensible answer, however, is that it is clearly *both*. No competent authority today questions that differences in environment affect the level of intelligence achieved. It is equally certain that hereditary factors have considerable influence. Despite a great deal of interesting research, it is still too early to say in general how much is attributable to inheritance and how much to environment. And even if we knew the general answer, there would still be individual variations.

It is possible, however, to rephrase the question in more practical terms. First, granted run-of-the-mine conditions of life, how much do people change in relative intelligence? † Apparently, rather little. Thus somewhat less than half of the children who are carefully re-examined show a change of five points or more in the so-called intelligence quotient (when based on the 1916 Stanford Revision of the Binet test).⁵ There is thus a very real possibility of predicting the progress in intelligence and of all that depends upon it from a well-conducted examination for intelligence. This is not quite the same

* From his replies to the Brown Personality Inventory—a series of questions designed to help a psychological examiner to discover the symptoms of maladjustment. Less than one child in a hundred shows as many signs of strain and unhappiness as did Ralph.

† This is the question often misleadingly stated in terms of "Constancy of the I.Q." Since it is actually the exception rather than the rule for a child to receive exactly the same I.Q. rating on successive tests, there can be no debate at all as to *whether* I.Q.'s remain constant (as some educators unused to quantitative thinking have imagined there is) but only as to how nearly constant it is. Moreover talk of *the* I.Q. is very misleading.

thing as underwriting a prediction made by a half-trained person who has administered a "mental test" in routine fashion. For worthwhile results there must be expert testing and even more expert interpretation of test results.

Like any other prediction, however, prediction of intellectual development is subject to error. Even under what seem to be quite "ordinary" conditions, very considerable fluctuations in relative intelligence do turn up occasionally to plague the psychological examiner. And under especially favorable or adverse conditions, still greater changes take place.

Our second question, then, is: What are these favorable or adverse conditions? As might be expected, the cultural, educational, financial, and social status of the home all have a bearing on development.

But their influence is irregular. In the first place, the same home—even the same kind of parental behavior*—has different effects on different children. Thus if we place two orphans of equal intelligence in the same home, one may show gains and the other may not.

A genuinely psychological study of homes has scarcely more than begun. We can say with assurance that superior homes are *likely* to harbor the conditions favorable to the growth of intelligence; we are not so sure what these conditions are. Much adult talking with the child, even before he can talk back, seems to quicken the development of intelligence in the early years. Recent investigations^{6,7} give evidence that certain kinds of parental attitudes have striking effects on intellectual growth. Children with parents who "accept" them and respect their personalities, and who value and encourage their efforts without being coercive or over-solicitous, show an average gain in a three-year-period of about 8 points in Stanford-Binet I.Q., whereas children whose parents are rejectant show a small loss. (Other studies which thus consider the stimulus value of specific features of home and school for the development of intelligence should soon make their appearance.)

* The distinction between the home and parental behavior is important. It is obvious enough that parents seldom treat two children alike, but we tend to forget this fact when discussing the "influence of different kinds of home."

It is apparent, moreover, that the earlier in life the favorable influences act, the greater their effect; the critical years for determining relative standing in intelligence are those before the child goes to school. Thereafter, all children gain of course; but they seldom change places; the relatively dull remain dull and the relatively bright remain bright.

Practical Uses of Intelligence Testing.—From a practical standpoint all this adds up to the conclusion that the school can place considerable reliance upon the careful intelligence-test result. It measures only one factor in behavior, to be sure, but it measures that factor fairly reliably.

This gives us much greater control over the educative process. It is possible, for example, to judge much more safely whether a child is intellectually old enough to begin school or to carry on the work of a given grade. If he is failing, it helps us to narrow the range of possible causes of failure. And because, by the time a boy or girl enters high school, little change in relative ability can be expected, it is possible to rest educational or vocational guidance upon a fairly secure, even if quite incomplete, base.*

It is now possible, furthermore, to determine the level of intellectual maturity at which certain kinds of learning are possible, as well as whether a given child has reached that level. Thus it has been established that a very great deal of character education misses its goal because it mistakenly assumes a capacity to deal with abstractions about virtuous conduct of which the average child under ten is incapable. Both the curriculum and general program of the school and the judicious treatment of the individual are dependent upon our knowledge of intelligence and the relative constancy with which it develops.

*In some quarters this is dubbed a fatalistic doctrine, and one inimical to democracy. We fail to see anything undemocratic, however, in the attempt to find the kind of education or the kind of job which is best suited to a person's capacity.

There is an issue for democracy, however, although of quite a different character, tied up with the matter of intelligence tests. Half of the high school graduates who have the intellectual capacity for college work are denied the opportunity, chiefly because of lack of money. This is stultifying to both the principles and the prospects of real democracy.⁹

OTHER ASPECTS OF INTELLECTUAL DEVELOPMENT

It is difficult, we have seen, to modify a person's relative standing in general intelligence partly because it depends upon such a large number of conditions, many of them very little understood. This is less true, however, of more specific kinds of intellectual development. Growth in numerical skill, for example, depends to a high degree upon specific teaching and other opportunities for learning. Thus, while the prospects of altering the relative intelligence of a child are not, in general, very good, it is entirely possible deliberately to induce growth in number concepts and arithmetical skills, in handwriting, in knowledge of geography, and—we believe—in pleasingness of personality and in character.

Even here, however, one must reckon with the personal equation. Good teaching and bad teaching alike act on individuals of widely different inherent abilities. It is true that general intelligence is, as we have just seen, partly acquired. But when a fifth grade teacher faces the problem of teaching Joseph arithmetic, his intelligence operates for her as a "given," as something inherent in Joseph. Only in very exceptional cases will Joe's "IQ" change fast enough for the change to affect, during a particular school year, his ability to absorb arithmetic.

Relation of Intelligence to School Success.—Common experience, of course, fully confirms the theoretical expectation that there is a relation between intelligence and the learning of school subjects. It is more difficult than might be anticipated, however, to state exactly how close the relation is. Under ordinary school conditions intelligence correlates about .50 or .60 with scholastic achievement. This means that about a third of the differences between pupils is attributable to intelligence. But this relation holds only under the above mentioned "ordinary school conditions"; it is subject to very considerable change with every change in the circumstances. If all the pupils are very much alike in intelligence, the differences found will be nearly all attributable to "other factors" and the resulting correlation between intelligence and achievement will be low. If, on the other hand, the pupils tested differ very greatly in intelligence, then

intelligence will account for much more of the difference in achievement; and the correlation will be high. A blanket statement about the "true" relation of intelligence to achievement is simply impossible.*

Should Pupils Be Grouped According to Ability?—It is considerations of this sort which lend an air of unreality to most discussions of "homogeneous grouping." There is at least an initial plausibility in the idea that pupils should be divided for teaching purposes into groups of approximately equal ability. The proposal to do so (on the basis, in early days, solely of intelligence tests) met both enthusiastic welcome and heated protest. The plan was characterized on the one hand as violently undemocratic and on the other as the salvation of democracy. And elaborate statistics were prepared showing how much more (or less) was learned under homogeneous than under heterogeneous grouping.

Apparently it did not occur to most of the contestants in either camp to notice that any system of dividing pupils by grades is already a form of "homogeneous grouping," and that what was being debated was merely a question of how much further to carry the grouping. The answer, moreover, is clear: *Other things being equal*, the more nearly pupils are equal in ability, the more nearly they will profit equally from the same instruction.

Unfortunately for simplicity, other things never are equal. Complex problems of motivation present themselves: Will the dull be better motivated if grouped with others of like intellect or be stimulated by the performance of the superior children? (The former, apparently.) What is the effect on personality? Are children thus made too acutely aware of intellectual differences, with resulting conceit or shame respectively? (That depends very largely on how the system is handled; in general, segregation apparently tells the children nothing they haven't long guessed about their own abilities, but it sometimes gives openings for opprobrious remarks about the infer-

* That is, in the absence of a true zero point in the measurement of both intelligence and achievement. Our statement is an elaboration of the practical deduction to be made from the acknowledged relativity of measurement in these fields.

ior.) Should not social development be a factor in grouping? (Without question; probably it is the first thing to be considered. But we cannot tell in general which makes more social maladjustment: To be schooled with those who are decidedly inferior intellectually so that one gets into all manner of bad attitudes; or to be grouped with those physically and perhaps socially more mature. Compare the cases of Marian and Ralph in the preceding section. The question as to where the child is most likely to be well adjusted must be raised in each individual case on its own merits.)

And so one might go on. Obviously the proper placement of a child in school is to be decided on the basis of *all* his characteristics, not just on his intelligence. We try to put him in the group where he will show the greatest all-round development.* At most, we can say that intelligence is the leading determiner in individual cases more often than any other quality.

Special Talents and Defects.—It may be urged, however, that achievement in arithmetic or music or languages is determined more by special talents than by general intelligence. The question of the very existence of special talents is a thorny one. Some psychologists seem to deny them altogether, others to minimize their effect. On the other hand, the procedures known as factor analysis have been bringing to light certain “primary factors” which may be thought of as basic special components of intelligence. Of one thing we may be quite sure: It is in the last degree unlikely that we are born with special talents corresponding at all closely with the highly artificial and conventional divisions of school subject matter. The boy or girl “just naturally” good at figures was not really “born that way”; his special flair is acquired.

Even so, for a particular teacher special talent and, more pressingly, special disability are like intelligence, somewhat in the nature of a “given”; in one short year, the teacher cannot hope to make up *all* the deficiencies of previous environment and training. Struggling

* Perhaps we should make very explicit the implication of this conclusion: That *some* children should be accelerated, others decelerated. The flat dictum that “no child should ever be accelerated beyond his own group” is an emotional begging of the question as to what his “own group” is.

with the reasonably intelligent girl who repeatedly confuses the imperfect with the imperative, the teacher may be excused if he concludes that "the gift of language was just left out of Amy's make-up."

Careful investigations, however, clearly indicate that school failure is rarely if ever due to such specific and irremediable defect. Amy's dullness in French, Carl's stupidity in history, and Marylyn's failure at contract bridge are all found to be due to a subtle interplay between interests, early training, and present motivation. The situation can always be modified by effective teaching aware of the individual factors operating in each case. Whether in a given case it is worth the effort, whether for example it is worth while to struggle with Amy's French, depends upon the values put upon a particular subject of study *for a particular child*. At any rate, the pupil's present intellectual status is less useful as a fatalistic determiner of what can possibly be learned than as a guide to where and how to set about the educative process.

THE DEVELOPMENT OF PERSONALITY

Without explicitly saying so, we have discussed the growth of personality while considering physical and intellectual growth. A brief specific treatment of the development of personality, however, would seem to be in order. Unfortunately it is beset with grave difficulties.

In the first place, although there is a very real sense in which we may speak of the unity of personality, the development of personality must be considered as proceeding along many relatively distinct lines—even more so than in the case of physical or intellectual development. The trouble is that we do not know just what the basic lines of development are. This gives rise to difficulties which are by no means purely academic.

Likable Personalities.—Let us take a simple example. Since personality is primarily a matter of emotional and social adjustment, it seems not unreasonable to consider "likability" as one of its components, and growth in likability as a goal of educational effort. Well,

here are two children, both rather disinclined to talk very much. In other respects, however, they are very different; they belong, as we sometimes say, to different types. It is clearly conceivable, therefore, that the training which increases talkativeness may make one child more likable, the other much less. We succeed in being likable, in other words, by so many different means that no single training formula is of much value.*

Neglect of such considerations is a prime error in the mail order courses which promise to develop in everyone a radiant personality. The sovereign remedies, the little tricks which take no account of basic factors—it is folly to think of applying these mechanically to all and sundry. The small good they do in a few cases is more than offset by the harm done in the vast majority of cases by raising unfounded hopes and by encouraging people to depend upon essentially magical procedures instead of rationally directed effort.

The commercial success—for their sponsors—of such courses should, however, be a source of shame to psychologists. It points to a need for a sound program which we are as yet ill-equipped to supply. Indeed the success—again for the salesman—of quack schemes for improving oneself or one's condition "in twelve easy lessons" is a challenge to all educators. And the educational psychologist might well ask, in the cant phrase of the day, "What do these quacks have that we don't have?" that they are so successful in peddling their wares.

Maturity of Personality.—Another difficulty faces us when we seek to improve personality—certainly not one which troubles the "get-rich-in-personality-quick experts" but one which does perplex the real educator. In the case of physical and intellectual growth, we have little doubt as to the value of reaching a mature level, and small doubt as to what maturity is.

When we turn to social or emotional maturity, however, we do not know just what it is or just what kinds of maturity in personality are desirable and should be sought in education. Growing up, in

* The difficulty is not lessened by the fact that all personality traits are to some extent relative to the observer. Not only does each one attain likability in different ways; one's likability is a different thing for different people.

this field, seems somehow intimately related to the culture in which a child lives. In our culture, for example, growing up involves coming to terms with competition between persons. To become an adult thus means learning how to compete successfully. But as Margaret Mead¹⁰ has shown us, among the Arapeshes of New Guinea there is no need to develop aggressiveness or competitiveness, and growing up does not in that tribe involve development along these lines.

Now of course we are engaged in educating young Americans, not young Arapeshes, and we should, reasonably, prepare them for the society in which they are to live. Society, however, is not static but eternally changing; and education, is, or should be, a prime agency in such change. Perhaps we have too much competition in our social life; in that case education should discourage competitiveness. Eventually it might be possible to develop a social order in which competitiveness might seem not adult but childish.

At least for the present, however, it is clear that education will be some kind of a compromise. Children will have to learn to adjust themselves to a world in which competition is a fact and maturity will therefore involve learning how to compete. But they may also learn that there are many values in life, some of which are really antagonistic to competitiveness; and they may learn to work toward a form of society in which aggressive competitiveness shall be at least minimized.

The example shows how complex is the problem of attempting to chart progress toward the goal of mature personality, when we aren't sure just what maturity means. It would be misleading, however, to emphasize our ignorance at this point unduly. We certainly cannot say that extroverts are more mature than introverts; but we can describe forms of both extroverted and introverted behavior which are more mature than certain other forms of extroversion and introversion. We can certainly declare that the modulation of emotional response, its nice gradation to suit the objective requirements of the situation, is more mature than the explosive, all-or-none response which is so commonly exhibited by the child.

Maturity of Interests.—In the field of interests, also, very significant studies have been made which show that growth toward

maturity takes certain characteristic directions—at least in our present society.

Thus one has only to examine surveys of childhood interests (or indeed to recall his own development) to discover that not only do interests change markedly, but that there is a fairly consistent pattern and direction to that change. From simple five-year-old games of tag, playing house, or playing with blocks the development is rapid through active sports and games at ten, more complexly organized sports at fifteen, and a rapid turning to social interests—dancing, cards, etc.—during adolescence. Girls give up their dolls for more adult interests, for dates. Boys gradually discard their marbles and kites and turn to the sex-social sports of swimming and tennis, which in the 'teens become popular with both sexes. In short, play tends to increase in complexity and vigor with physical and mental growth, and the recreational situation becomes increasingly dominated by sex-social interests. At first recreational interests are not distinguishable from the vocational; as the years slip by into adolescence, vocational interests become more serious, better related to the workaday world if not always to the youth's capacities.

Now deviation from the normal interest development in any one respect need not be serious, although it is usually significant. It would be a mistake to consider an adolescent girl abnormal if she found great pleasure in dressing dolls; it would be equally a mistake to ignore such a deviation from the usual. Behavior of this sort needs to be understood in relation to the whole personality.

It comes to this, then—that to know the course of normal development in respect to a number of interests enables us to check on an individual child, to see where he is falling behind his fellows to a crippling extent; and particularly to note those cases where interests remain impoverished and juvenile.* Even a mere statistical concept of what is mature often proves distinctly useful.

Signs of Unwholesome Development.—Nor is this all. Even if

* For adults, of course, a certain restriction of interest range becomes a necessity of effective work. But a child or adolescent needs many and varied interests, both because life is pleasanter and because an exploration of future possibilities is desirable. Finally the matter of interests after retirement is of concern to educational psychology.

we cannot say that this or that line of development is more mature and therefore more desirable than another, there are certain other kinds of development which we can say are definitely unwholesome or dangerous. Not, however, that even these are obvious. In principle, to be sure, we should all agree that any kind of development which pointed toward mental disorder or criminality was most undesirable, but a long line of investigators have shown that parents and teachers do not recognize the signs of incipient unwholesome development. They tend to be more exercised when a child exhibits troublesome or bothersome behavior than when he acts in mentally unhealthy ways. Recently there have been indications that more attention is being given to wholesomeness of personality; apparently emphasis upon the mental-hygiene point of view is producing some results. But the change is not yet great, even as a matter of accepted point of view; and one strongly suspects that the change in practice is even less.

One does not wish to close this very brief survey of the development of personal quality on too negative a note. Scientific study of personality has barely begun, yet much has already been accomplished. Studies have shown how readily children's attitudes may be changed by movies, the radio, drama, and the arts. They have shown, too, something of the limitations of moralizing instruction and have suggested some of the reasons for its failure in most cases. The very valuable studies of *Character Education Inquiry*⁷ have at least shown us some of the ways in which character does *not* develop, and have thus laid the basis for a constructive approach. Even now, educational psychology is rich with many, if somewhat isolated, suggestions for those whose privilege it is to assist children in developing fine personality and character; the near future should see extraordinary progress in this field.

PROBLEMS OF LEARNING

While biologically determined growth plays a role which cannot be safely ignored, the preceding discussion adds up to the conclusion that development is even more largely a matter of learning. How then does this learning take place? What sorts of conditions are

favorable or unfavorable for learning? How can we deliberately assist learning and development? What are the principles governing effective learning? A large part of the work of educational psychology consists in the experimental and empirical search for principles or rules in answer to such practical questions.

A Definition of Learning.—There is little that unifies these detailed rules, but there is this common element: All are concerned with the way the organism, be it human or other animal, improves as the result of reacting to its environment, of taking part in an experience, of practice. This, in fact, is the best we can do in the way of a brief definition of learning.

Learning as thus defined is, of course, only part of the total story, and there is some hazard involved in taking a partial view. In specific investigations therefore we often need to take account of the way in which improvement depends upon heredity and upon biological growth processes as well as upon experience or practice.* Often, on the other hand, it is possible and useful to abstract from growth and from the individual differences which stem from heredity, and to emphasize the sorts of conditions which facilitate the learning aspect of improvement.

Learning Theory and the Applied Psychology of Learning.—It is clear that the above definition of learning ignores the question of what, in basic psychological terms, learning is; instead it is oriented toward practical considerations. Legitimately so, we believe, since the very term “learning” has been taken over by psychology from education and everyday life only in comparatively recent time.

Yet for over fifty years there has been active experimentation designed to answer the other and more fundamental question as to the psychological processes which must be present when an organism learns. Several distinct theories have emerged. (See Chap. XXI for a brief discussion.) The present writer believes that the conflict between these rival theories may be resolved if we recognize that they are attempts to explain actually different psychological events. The overt changes in behavior which we

* The term *maturation* is sometimes (but not always consistently) used for the fact that heredity and prior development flow together to influence present change

call learning come about, according to this hypothesis, as the resultant of two or more distinct kinds of personal or organismic activity. Although these activities are probably always present in any learning, one or other of them may be more influential under this or that condition of learning; and the several theories are developed in explanation of these conditions. To cover the whole of learning, then, we need to combine most of the features of the supposedly rival theories.

For the present, however, we must accept the fact that there is no agreement as to what learning fundamentally is. Fortunately it is not necessary to await the discovery and formulation of a sound general theory before we attempt to find experimentally and empirically how to learn and how to help others learn. Practical and theoretical experimentation may proceed concurrently.

Such experimental work overlaps, of course, in countless ways. Suggestions for more efficient modes of learning may very well come from studies designed to reveal the nature of the underlying processes. (Particularly helpful have been some of the studies of motivation in relation to learning.) Needless to say, moreover, everything we learn about how to learn quickly, easily, without error, and permanently, has immediate relevance to the question of what learning basically *is*. At the level of research a constant interchange is going on between the theoretical and the applied psychology of learning.

The explanatory concepts used are, however, more divergent; those developed in general learning theory seldom have direct and important utility in application. Take such a practical problem as the way "emotional blocking" interferes with learning. For general learning theory it is necessary to inquire just how emotional blocking affects the underlying learning process or processes. There are a number of alternative explanations. One such might be that the emotional blocking sets up "retroactive inhibition." Such an explanation, even if we knew far more than we do now about retroaction, would give us little help in avoiding emotional blocking. Almost certainly, moreover, emotional blocking has other effects which stand in complex and as yet unknown interrelation with those of retroaction. The educational psychologist, therefore, and the practitioners whom he seeks to guide, must operate for the present and for any foreseeable future in terms of larger and admittedly incompletely analyzed explanatory concepts—"emotional blocking" is a good example. By so doing we find ourselves able to effect important gains in the control of learning.

Although it thus utilizes unanalyzed or "molar" explanations, educational psychology should not cease to be psychology. It must hew to the line, that is, of explaining in terms of *what the organism does*. To see what this criterion means, consider another important finding about learning. It has been shown that children learn better in a "democratic atmosphere." This is not a psychological explanation: A "democratic atmosphere" is not what a child does, it is done to him. The democratic atmosphere is no more a direct cause of learning than books in a home are a direct cause of a growing vocabulary. Just as the child must read the books if he is to profit from them, so he must do things differently in the democratic atmosphere if he is to learn more effectively. (And as a matter of fact, some children do *not* profit from democratic treatment; they must be re-educated before they can.) It is the task of educational psychology, often very imperfectly performed, to restate educational problems in terms of what they imply for the learner's behavior.

Learning as Activity.—Learning is not passive absorption but an active response made when the learner experiences a need. Indeed the learning is effective in proportion as the goal is specific and well-defined. We must not overemphasize a conscious understanding of this goal, although that may be useful. What is necessary is that the target be specific, that there be activity, and that it be directed at the target.

It may be theoretically possible to learn wholly unintentionally; there is a considerable amount of not very convincing evidence on this point. It is unnecessary, of course, for the learner to say to himself, "Now I want to remember this"; that may even act as a distraction.* But for effective learning (most investigators believe for any learning at all) it is necessary that the response to be learned have definite relation to a goal, that the learner be actively attacking a problem or problematic situation.

This necessity for activity has in theory long been recognized. Without activity there is no learning. Hence the old so-called "Law of Use or of Exercise" (which held that learning is proportionate to exercise or repetition) and the emphasis in school upon drill, how-

* None the less, a certain conscious realization of what one is trying to do is a help. A whole series of experiments show how little is learned unless there is *intent to learn*. Unfortunately intent to learn is not enough!

ever mechanical. We now realize, however, that the activity must be activity directed toward a goal, fulfilling a need.

More Than Activity Is Necessary.—In a long series of experiments, Thorndike, who first clearly formulated the “Law of Use,” has himself shown its limitations. What happens, he asked, when a person is frequently confronted by a situation, or when he acts many times in the same way in the presence of a situation, without realizing the relation of the act to the situation. Results were quite unequivocal. Repetition of a situation in and of itself confers no learning. Reacting in the same way to a situation with no realization of the relationship the act has to the situation does not necessarily lead to a strong habit. There are many illustrations of this in everyday life. Consider that “you practically always raise the body and bend it back after tying your shoes, and so have the sensations of bending the body back as a sequent to those of tying your shoes. You have done this from 10,000 to 40,000 times—but the experience of tying your shoes has probably never called to mind any sensation—of the backward body-bending.” Thorndike concludes, “All educational doctrines which attach value to experience or activity as such, irrespective of the direction of the experience or activity and of its consequences, are made less acceptable than before. Experience, in the sense of merely confronting and responding to the situations of life, can hardly be a powerful agent for either good or harm when several thousand repetitions of such an experience do so little.”¹¹

Learning and Meaning.—Exercise or activity must be supplemented, then, according to Thorndike, by a realization of its “Belongingness.” When we learn a motor skill—riding a bicycle, for example—it is rare that its personal significance escapes us. We know what we are trying to do, even though the relation of subordinate part-skills to the whole is not always grasped. When it comes to knowledge or “book learning,” however, it is quite clear that all too often the material offered the child has no relation, which the child can see, to his personal goals or needs.

Now in proportion as it lacks such relation, the material offered is uninteresting or meaningless. And a long series of experiments

have made clear that learning is efficient almost in proportion to the extent that what is learned possesses meaning.¹²

Indeed, were it not for the kind of learning which finds its clearest expression in the conditioned response, we should be tempted to suppose that meaningfulness is an absolute prerequisite to learning. But there is too much evidence which seems to show that there is learning of a sort at least partly independent of meaning, that almost meaningless material can be learned (and of course thereby take on meaning). English and his co-workers, in an extended series of experiments, have put to the test a reformulation of an earlier hypothesis: That there are two sorts of learning, one which is like the conditioned response, is uninfluenced by meaning, and depends primarily upon frequency of repetition; and another which is directly dependent on meaningfulness (and probably independent of repetition). These two processes, however, are never found apart, though their respective contributions to a given bit of learning may vary.¹³

While a considerable body of experimental fact from various sources seems to support this hypothesis, the issue is far from clear. For one thing, meaningfulness is an attribute of the learning task, whereas the learning process must ultimately be characterized in terms of some activity of the learner. "Insight," "belongingness," and "reorganization" have been suggested as better descriptions partly for this reason.*

In any case the statement stands that meaningfulness makes for efficiency. To establish what is properly called a conditioned response (in which meaning is apparently all but ruled out) usually requires many repetitions and such highly special conditions of isolation of the animal from all competing stimuli that it cannot be considered efficient—except in the sense that we can by this means learn what cannot, apparently, otherwise be learned at all. And when we turn to classroom conditions the superiority of that which the individual learner finds meaningful is beyond all question.

* There may seem to be a perplexing variety of terms used to express the fact that activity alone is not enough. The diversity is not due to inability to agree on words; it is due to the fact that the "something other than activity" is as yet not accurately isolated and identified, hence can be only approximately named. But there is energetic experimentation which should shortly remedy this defect.

Interest and Learning.—The doctrine of interest in education, as set forth by John Dewey, finds here much of its validation. Dewey's position, though stated with great clearness, has often been grossly misinterpreted. The teacher was expected to trick the child into learning by dressing things up in an "interesting" dress—which was to run the risk that only the interesting concomitants would be learned.

Interest Depends on Meaning or Significance.—It would probably be much better if teachers were not told that they should interest the child. "Interest" is only indirectly a cause or a favoring factor in learning. Instead, let this be firmly realized: The child finds interesting that which is significant or meaningful for him, that which evokes in him purposeful striving. And it is under these conditions also that he learns. The feeling of interest is obviously not so much a *cause* of learning as a *sign* that the effective conditions of learning—namely significance or meaningfulness—are present. Interest is a guide, not a goal of teaching.

The practical difference is very great. The teacher is led to be concerned not to see that things are made "interesting" but that they are made significant, and hence learnable. He must insure that what is offered for learning will be seen as relevant to the goals and purposes which are alive for the learner.

It is probable that Dewey's position was misunderstood at least in part because of a confusion between the "feeling of interest" and "interests." Of course these are related terms but they are not the same. The feeling of interest is part of the response we make to anything significant; our interests, on the other hand, are merely another name for the above-mentioned living goals and purposes which must be "tapped" if learning is to proceed. The one is a symptom, the other a necessary condition. It seems to the writer much safer therefore if we usually avoid speaking of interest and think rather in terms of the significant or the meaningful, of that which is relevant to purposes.

Even so, we cannot evade the question whether we do not imply a curriculum built around the necessarily immature purposes (or "interests") of the child. How, one may well ask, is society to

progress if education must be guided by the evanescent whims or transient enthusiasms of the child? In one form or another, this question is raised in every class in teacher training, year after year.

Now of course the answer is that only very superficial followers of the doctrine of interest propose to identify the goals of education with the child's goals or interests. We do indeed propose to build the curriculum about the child's present interests—that is, about the goals or purposes which are real for him—but we do so in such a way that his interests will expand and develop in an intelligent and adult direction. Not present purposes alone but purposes as they may become is the concern of education.

Motivation and Learning.—It is sometimes said that if we can only link learning activities to the urgently felt needs of the pupil, there is no problem of motivation. We should not, however, allow our sense of the dramatic to run away with us. Thrilling purposes and pressing needs are colorful and obvious; but the greater part of a person's learning goes on in quieter fashion when meeting less dramatic crises or solving more humdrum problems. Under favorable circumstances a relatively weak purpose can be the occasion of most valuable learning, and fortunately so.

We must not forget, however, that a person is the focus of many needs of differing strengths, and that the respective responses to these needs are sometimes mutually incompatible. Some of our needs, therefore, may fail to give rise to learning activity unless the relatively weak purpose is somehow strengthened. Such strengthening of the relatively weaker purpose is what we mean by motivation.*

Now it seems to be the typical school learning situation to require some degree of motivation. Relatively seldom, whether he likes it or not, can the teacher establish a direct relation between a powerful purpose in the pupil and the learning activities that we wish.† A

* We are not for present purposes making a sharp distinction between incentive and motivation.

† The last phrase reveals the writer's educational philosophy that society may legitimately impose upon the child certain ultimate objectives, such objectives as skill in the use of language, adequate arithmetic, graceful and healthful posture, honesty, love of country.

The whole confused issue of propaganda in education is, of course, involved. Let us merely record our judgment that the school cannot escape the task of

major responsibility is to get pupils to learn many things for which, to put it mildly, they have no great yearning.

There is thus a real problem of motivation. Many psychologists, however, have come to believe, on the basis of extensive experimentation, that motivation has no direct effect on learning. This sounds pretty serious until we ask what motivation does do. Its function, we learn, is to stimulate activity or performance. Now activity, as we saw in an earlier section, does not necessarily lead to learning; but there is no learning without it.* Hence motivation may, by stimulating activity, indirectly enable us to promote learning and especially to guide learning in appropriate directions.

An obvious caution is, however, suggested. Since mere activity is insufficient, there still remains with the teacher the duty of rendering what is to be learned not only attractive but intelligible. And we must not expect to find any direct proportional relation between the intensity of motivation and the amount of learning.†

Socialization.—As a schoolroom device for motivation, socializing the learning period is one of the most interesting and useful. One can easily think up a number of reasons why children learn better when working by themselves. The experimentally demonstrated fact is, however, that efficiency is decidedly increased by a large amount of social activity in learning. (Of course there is also need for a great amount of strictly individual studying.)

Thus certain German psychologists as early as the beginning of the century found performance notably improved under social conditions. They found homework less accurate and less rapid than work done under such social conditions as a study hall provides. Many laboratory studies, both there and in this country, were later carried

selecting objectives for the pupils. One primary objective—still selected by adults for the pupil—may well be that the pupil shall develop intelligence enough ultimately to choose for himself; but even this does not enable the school to avoid intermediate guidance. Those who hold otherwise seem not to understand the implications of their words.

* Sometimes we seem to get such a direct relation; every increase in motivation is paralleled by an increase in learning. But in other carefully controlled experiments this is not the case. Leuba gives an illuminating discussion.¹⁴

† There is a sense, of course, in which whatever we do leads to a change—and this may be called learning if one wishes. More often, however, we think of learning as a *progressive* change or improvement. And activity certainly does not guarantee, but is necessary for, improvement.

out in which the mere presence of other persons seemed (in general) to improve performance.¹⁵

More important for school practice is the series of experiments on the *cooperating* social group. The experimental work on this subject, both in the laboratory and in the classroom, has been well summarized by the Murphys.¹⁶ Not quite all the results are consistent, although the trend in favor of group study and discussion as compared with more individualized procedures is fairly clear. The following are, perhaps, typical. Barton¹⁷ found that four days of group discussion of algebra problems produced a large and reliable superiority in achievement over the method of individual assignment, initial ability and training being carefully balanced. Bane¹⁸ found discussion particularly helpful for long-time retention—probably because discussion insured more active participation and an attempt to understand interrelations.

Most impressive of all is Collings' ¹⁹ four-year comparison of a highly socialized with a more conventional school program. A number of other factors in addition to socialization doubtless played their part, so the experiment cannot be regarded as very conclusive. But we can hardly ignore a program in which the socialized groups did 38 per cent better in school subject matter than did the comparison groups from the same county.

It is worth noting that the pupils were also learning how to cooperate as well as learning subject matter better. Collings reports also marked superiority for other desirable learnings in the school which socialized its program.

Coming at the problem from a very different angle, Lewin and his associates have shown that the cooperative situation is decidedly more favorable to the development of personality (which after all is also a matter of learning) than individualistic procedures.²⁰ All in all, the argument for cooperative or socialized situations is too strong to be ignored—although whether it is strong enough to overcome the inertia which protects traditional practice is another matter.

Competition and Rivalry.—This is, of course, the commonest device to stimulate individuals to learning activity. Its influence was eliminated with difficulty from most of the studies made of the effect

of socialization. Is it effective in increasing performance and activity? Undoubtedly. Whether competition or any other motivation produces learning rather than mere activity is, as stated above, probably dependent upon other factors.

Certainly children who would never for a moment have done certain things necessary for learning have been aroused by competition, by rivalry, to intense activity. All too often, however, the feverish activity fails to lead to learning or to the learning desired. Emphasis upon competition may result primarily in learning how to compete. Whether this seems a desirable outcome depends partly on one's social philosophy and very much upon the personality of the learner—most of us, apparently, need to learn how to cooperate far more than we need to learn how to compete.

Much experimental ingenuity has been expended in the attempt to discover the relative potency of various kinds of competition. Thus Maller,²¹ working with higher elementary school classes found the motives studied to be effective in the following order: (1) Work for one's own sex; (2) work for oneself; (3) work for one's team (constituted by pupil choice); (4) work for one's school class; (5) work for an arbitrary group assigned by the teacher.

It must be noted, in the first place, however, that these are only group differences. For a given child one of the motives which is weaker for others may be very much the stronger. Psychologists and educators, although they talk much of individual differences, have yet to learn to take them seriously. Whenever, therefore, we are presented with an average we should at once reply: "Interesting and useful but what about individuals?"

In the second place, apparently very slight changes in circumstances modify the result. Thus the frequency with which the children were shifted from one motivation to the other affected the differences in performance. Obviously the situation is extremely complex and description in terms of "self-competition versus group competition" is only a very crude first approximation to a careful analysis.*

* That is, experimental results and theoretical analysis alike suggest that competition is not a unified variable at all but only the name of a *complex* of influences which may affect performance in differing ways.

Finally we must note again that Maller was measuring the effect of competition on *performance*, not directly on learning. It is certainly easily possible, even probable, that self-competition is more *likely* to result in a meaningful performance than group-competition. When, that is to say, one is working against one's own record, one is more likely to ask what it is all about.* In any case, we must always be alert to ask ourselves *what* is being learned as a result of the activity induced by the competition. The writer, for one, admits his inability to say by sheer deduction what are the personality and character effects of self-competition or whether they are better or worse than those of group-competition. Yet such learnings are obviously of more critical importance than learning the location of Danzig and its relation to Polish commerce—significant as the latter is to one's world outlook. A more mature educational psychology such as is beginning to emerge will not leave such questions to speculation.

Reward and Punishment.—Another familiar motivation is the giving or promising to give rewards, the inflicting or threatening to inflict punishment or pain. In view of the conflicting experimental evidence, the naïve confidence of most parents and teachers in these modes of motivation is most curious. Almost certainly the problem is not even properly stated in terms of “reward” and “punishment”—almost certainly, that is to say, there is no one kind of thing which happens to a person, no one process which goes on inside him, when he is “rewarded.” And it is still less likely that “punishment” can thus be regarded as a unitary variable. It is therefore hardly reasonable to expect to find any consistent relation between punishment and either learning or performance. Very severe punishment fairly consistently disorganizes the recipient and interferes with adjusted response and with learning. But milder punishment sometimes seems to help, sometimes to hinder. And what constitutes mild or severe punishment is almost impossible of general definition.

It seems hardly worth while, therefore, to review the experimental literature dealing with this subject. Most of it is designed to throw light on a complex theoretical issue which remains com-

* If, however, group-competition is associated with discussion, self-competition may lose this advantage.

pletely unsettled. The practical question, however, remains: Should the school use punishment and reward, either or both?

It is necessary at this point to make a distinction between the strictly disciplinary use of punishment and the use of punishment for the promotion of learning. Disciplinary punishment is a way of stopping a child from doing something.

Now in a particular case, it may or may not be necessary or valuable to stop what a child is doing. Punishment may be necessary—or at least the only thing a harassed teacher can think of—to keep one child from disrupting the classroom and thus prevent *other pupils* from learning. It is even possible to use punishment to keep a child himself from learning bad habits. But it does so, not by acting directly on the learning process, but by stopping the activity from being exercised.

Obviously the latter case involves, if it is to be effective, very close supervision over the whole life of the pupil, and is, therefore, generally quite impracticable. A teacher might, by very severe punishment, prevent pupils from practicing during school hours an undesirable speech form; such as the double negative “haven’t got no.” But the teacher controls only a small part of the pupil’s day. He may prevent practice of “haven’t got no” ten times a day while forty other times it goes unprevented. If the punishment is unusually effective, the specific speech habit may even be completely inhibited *in the classroom* but it usually remains undiminished elsewhere. The purely disciplinary use of punishment is too negative to be of much use in learning.

But is the disciplinary value the only use of punishment? Is there not a “Law of Effect” which states that the painful or the unsatisfactory effect of an action causes it to be unlearned? The answer apparently must be in the negative, both on grounds of theory and everyday experience. The punishment of a rat every time he takes the wrong pathway in a maze experiment serves eventually to compel the rat to take the *right* path—he has nowhere else to go. And the learning comes from what the rat does, not from what it does not do. But punishing a child for an error in grammar or in morals is quite different from punishing the rat in a maze; it still leaves him with an infinitude of other errors to make. Under ordinary condi-

tions, punishing a mistake is obviously less than half the battle. And indeed a candid examination of the human scene must convince anyone of the persistence of error despite the clearest indication that the error leads to ill effects.

None of this, of course, calls into question the fact that men or children sometimes deliberately and rationally refrain from doing things because of the fear of consequences. If we are not as rational as we like to think, it cannot be doubted that we are occasionally able to rise above the level of immediate impulse. Punishment and reward may therefore play their part as *guides* to learning, as signals to the learner as to what he is to try to learn. As such their consideration belongs in the next section. But there is very inadequate evidence for the common belief that either punishment or reward has a direct effect on the processes of learning. Like other incentives, they may redirect *activity*—which may or may not lead to learning, or to the learning desired.

This leads us once more to point out the danger inherent in the use of incentives. It is highly unlikely, of course, that the child who is rewarded learns *nothing*; the trouble is that he is too likely to learn merely to seek the reward. Thus in school, marks may become the end sought instead of skills, knowledge, and character. It is equally unlikely that the punished child learns absolutely nothing. But since we learn only what we do, the child's learning is all too likely to be limited to hating or fearing the adult who is chastizing him. The emotionally charged atmosphere of punishment and conflict is certainly tremendously unfavorable to learning anything else. To use punishment, therefore, as an emergency measure of discipline to put an end, then and there, to serious or dangerous misconduct may well be defended; but those who use it as a way to promote learning must reckon with its purely negative and highly ineffective nature.

Guidance in Learning.—All education may be thought of as an attempt to guide the learning process. Yet how surprisingly little we know about the intimate details involved. When should we help a pupil—if at all; when should we let him work at his problems by himself? And by what techniques shall we proceed? One of the

earliest techniques studied scientifically is also one of the oldest as a teaching device. The pupil is physically constrained in some fashion or other while performing the act to be learned. The hand of the little child is held and guided as he forms "his letters" or the letter to be formed is grooved and the pencil traces in the groove.

The chief defect of this technique is that the child does not learn the right activity. Tracing letters is just not writing. Learning to be sensitive to the pressures of the teacher's restraining fingers when one's movements go astray is of little help when the teacher's hand is no longer there.

Mechanical Guidance.—Mechanical aids to learning have therefore come into marked disfavor—and rightly so if they cause the learner to develop dependence upon the device. This need not be the case, however; indeed the exact opposite effect may be secured. Thus during World War I the writer and two associates²² developed a device which demonstrated to the inexpert rifleman that he was not "squeezing the rifle stock" hard enough in the process of firing. The device permitted, indeed almost compelled, the learner to get the "feel" of a proper squeeze; and it set up a standard by which he could tell when that proper "feel" had been attained. The device was amazingly successful in the teaching of men given up as hopeless by their company officers.²³

How does this differ from teaching children to write by tracing in a groove? Clearly in this: That the learner is not taught dependence upon any cue to correct performance which he cannot have in ordinary practice. Rather the device served chiefly to turn the learner's attention to precisely that guide to correctness which he must in this action always use. Even in seemingly routine skills there must be a sort of "understanding" or insight, though that understanding may be sensory rather than intellectual; and any guidance given must have as its purpose to promote this grasp of what is to be done. Guidance by mechanical means thus differs only in unimportant detail from guidance by explanation and direction in words.

It is probable, however, that in nonverbal performances physical guidance may be very much more effective. The traditional verbal directions for the "trigger squeeze" are simple, clear, and vivid—but

they work badly for many recruits all the same. "Is *that* what the lieutenant meant?" was their characteristic comment when once they got the "feel," the kinesthetic cue, to the correct movement. Both school and industry need to give increased attention, in the writer's judgment, to the possibilities of nonverbal guidance for motor skills. Only—the guidance must promote, not hinder, the learner's acquisition of insight into the essentials of his performance.

Guidance by demonstration, depending on the learner's imitation of correct performance, is another established procedure. Indeed in many learning situations it seems almost indispensable. All too often, however, demonstration, like mechanical aids, fails to convey to the learner what he needs to do. Nearly everyone has tried to teach a dog or a cat by this means—and failed. Apparently success usually comes when the animal is about to perform the act in question anyway. The case with children is not greatly different. Almost we can say that demonstration works only for those who have already "got the right idea"—that is, for those who have already surmounted the highest hurdle in learning.*

Verbal Guidance.—For most persons, teaching is taken to be nearly equivalent to verbal guidance. It is actually so much more than that! Yet, although teaching is so much more, we must not undervalue in theory—there is small danger that we will in practice—verbal exposition, that most characteristically human method of inducing learning. Most primitive is the method of description and direct injunction. The method is valuable, as Davis²⁴ says in an excellent summary of this topic, "because it can be adapted to individual needs and repeated in various ways until the learner has a thorough comprehension of every part of the process. It is probable that no other form of guidance is complete unless accompanied by explanation and direction." Think, for example, of the difficulty in teaching deaf-mutes, and you will renew your faith in verbal instruction, despite attacks upon its excessive use.

Yet as every teacher knows, explanation may be utterly ineffective. As every preacher must confess, exhortation all too often fails

* None the less, children—and the anthropoids—do sometimes "ape" what they see and hear, and by so doing learn.

to promote the development of character or the learning of virtue. Here we must revert to the principle earlier propounded that one learns only as one reacts. So often verbal guidance does not cause the pupil to act at all or to act in the desired way. There is some reason to think that explanation has its chief value early in the learning period; later it is only a distraction.²⁵ Indeed this is almost certainly true of complex motor skills when considered as a whole. Yet even in the later stages of learning to play golf, for example, there is a place for the careful analysis of particular errors—this really means, probably, that for these errors the learning is in an early stage.

Knowledge of Results.—The mention of error leads, naturally, to our next topic. Theoretically—and most practically, too—it should be the purpose of teaching to prevent the learner from making errors. But so long as teaching remains a human and therefore imperfect activity, so long will errors be committed by pupils. A large part of guidance must consist in informing the learner that he has made an error.

There is an enormous body of experimental work which shows that knowledge of results is an aid—perhaps an indispensable aid—to learning. Most of the experiments intended to show the effect of praise or blame or of reward and punishment, may be more simply interpreted as tests of the effect of informing the learner as to how he is doing. Marks for excellence in school work are justifiable in proportion as they inform the pupil about his progress—their value as incentives is clearly less important.

The experimental work is on the whole remarkably concordant. Knowledge of results facilitates learning in virtually all circumstances but it is effective in proportion as it is (1) *prompt* and (2) *specific*.

The first requirement is *real* promptness. Ten seconds after the reaction is often too long; a tenth of a second is better. How different this is from much of our testing work in school. A teacher who returns pupil exercises the next day is a veritable paragon of promptness. Only when we can somehow reinstate the original learning activity does the delayed information have its full effect.

There are numerous devices intended to inform the learner promptly as to his success. Pressey²⁶ has devised a number of machines which score the "new type" examination in the classroom almost as fast as the test can be taken. And the Petersons²⁷ have worked out in their "Chemotester" a device which reveals to the pupil whether he is right or wrong as soon as he puts his mark on the test paper. Both plans have proved useful in practice. They are, however, a little different and a little bothersome for the teacher; hence they have not been widely adopted.

And then specific information. A grade of "C" may be as just and fair as you like, but it falls far short of telling a pupil precisely what it was that was wrongly done, or was well done. Even such a comment as "awkward sentences" or "poor organization of ideas" falls far short of being really specific.

Experimental studies in the laboratory (even studies with white rats!) and studies under school conditions show almost complete agreement. Let the learner know exactly where and how much he went astray if he is to improve.* Nowhere, however, is the gap between our actual practice and our best knowledge of how to teach more shockingly obvious.

Tests in the Improvement of Learning.—What is the reason for this neglect of sound practice? Undoubtedly one reason is that it is not easy for the teacher to know *specifically* just what the forty or more pupils are doing. How, then, can he inform them specifically? It is at this point that we touch once more upon a major activity of educational psychology—the improvement of our means of appraising pupil progress.

Too often the devising and giving of tests seems like an end in itself. Actually, however, tests are merely means for accurately determining just what a pupil has learned and what he has mislearned, to the end that the teacher may guide him rightly.

* Even if we must point to humiliating failure? Of course! Only—the failure should not be allowed to seem humiliating. It is not knowledge of success and failure which is in question here but other and far-reaching considerations of the total learning situation. It is not a quibble to insist, however, that when the learner really understands the situation, information as to wherein he has erred will not seem either humiliating or discouraging.

Not all tests need be of the "new type." There is a worthy place in education for essay examinations and for informal oral quizzing as well as the more recently developed "objective tests." There is room, nay there is imperative need, for teacher-made tests and for standard tests. There is need for tests of subject matter; but also of attitudes, of personality, of character—in short, for tests of everything that is to be learned or otherwise developed in school.

The testing movement, however, in its contemporary form at least, is new and has led to a great deal of very shoddy work. There is much valid criticism of tests and of specific testing activity. Particularly valid is the criticism that too many of our tests fail to measure the kinds of learning which it should be the primary aim of the school to promote. Nor is the criticism less valid because the critics seem to have no alternative but rest with a purely negative—not to say negativistic—attack on the "narrowness" of tests. The challenge remains: If we are to guide learning—*any* kind of learning—we must discover ways of promptly appraising just where the learner is going and thus of informing him promptly and specifically of his progress and of his straying from the true path.

Individualizing Teaching.—Guidance, however, does not consist wholly in knowing how to correct the learning process. Quite as important and indeed logically prior to such corrective teaching is the discovery of just what has to be learned.

When children first come to school, for example, they have an extraordinary variety of understanding of arithmetical concepts. In a large-scale investigation at Cincinnati, MacLachy²⁸ found that almost no child knew all the basic concepts necessary for effective beginning work in arithmetic, and there was no one concept known to all. Before beginning to teach arithmetic, therefore, a teacher should find out specifically just which concepts each particular child lacks.

This sort of situation is not limited to the first grade. Perhaps school tends to make children more alike—certainly our promotion plans are designed for that purpose. But we don't succeed. In every subject from "arithmetic" through "politeness" to "zoology," individual differences at the beginning of a study are the invariable rule.

In a course in educational psychology (preceded by a prerequisite course in general psychology) half the class knew more when the course began than the poorest did when it ended. Nearly 10 per cent achieved the passing grade before the course started.²⁹

How is one to determine what specifically to teach these students without an accurate and detailed appraisal of their individual achievements? Topic by topic throughout the course, some of the students are enduring "Twice Told Tales"—or worse—with a corresponding waste of learning time.

It is not only—or even mainly—the bright and the well prepared who suffer. At every level it is indeed a rare teacher who does not teach over the heads of most pupils upon occasion. And educational diagnosis (by means of tests and measurements of some sort or other) reveals how extraordinarily individual the deficiencies may be. Three children in elementary school were equally bad in reading. According to the older attitude of fundamental thoroughness, all three needed to be "drilled in fundamentals." One of these children, however, read words well enough but did not know that their position on the page or line mattered. The second just wasn't interested in reading—all he wanted to do was to draw. The third was failing because she lacked vocabulary. Effective teaching, of course, had here three radically distinct tasks. To have put these three children through the same first-grade reading routine would have been educational malpractice.³⁰

Finally it is only by adequate—and continuous!—appraisal that we can discover the level of insight and understanding achieved by each pupil and thus know for what new educative experiences he is ready. To send out teachers who are unskilled in the use of tests and other modern methods of relatively objective appraisal is comparable to sending out physicians untrained in the use of laboratory diagnosis, unskilled even in the use of clinical thermometers.

Retention and the Results of Schooling.—Obviously it is not enough to learn something; the result of learning must be available when we need it later for the solution of our problems—whether the

result be a bit of information, a new skill, reorganized thinking, or reconstructed personality. If these be transient, the learning is of little avail. How then can we maintain the gains made?

Overlearning.—Laboratory studies of learning have shown clearly the value of what is called—or rather miscalled—“overlearning,” as a means of making learning permanent. To study something to the point where one can just barely repeat it is to run the risk that it will be promptly forgotten. This is clearly true of all those forms of everyday learning that are parallel with the “by-heart” learning of laboratory experiments. Formulas, dates, telephone numbers, and definitions, all these are more permanently learned if study for the sake of learning is continued well beyond the just-learned point.

The writer’s own experiments, already referred to, make it somewhat doubtful, however, that memory for the meaning or substance of a passage is really helped by overlearning. Certainly frequency of repetition plays here a less important role. When the learning task is to discover new relations, to reorganize one’s thinking (or one’s conduct?), it does not seem necessary to repeat a successful performance in order to insure its permanence.

Yet even here, we must not minimize the effect of repetition. What we call logical or substance learning certainly includes, and depends on, a great deal of sheer by-heart knowledge and skill. Moreover, the first flash of insight, the first discovery is seldom complete. When we re-study something carefully, we nearly always discover new aspects, gain new understandings. And these new understandings come to the aid of the earlier ones and are supported by them. It is sound pedagogy, therefore, on many grounds, to urge that we carry the studying or the repetition forward beyond minimum limits.

Review.—Another principle derived from laboratory studies of memory has been found to be of prime importance in school learning. Forgetting is greatly retarded, learning is much more enduring if there is an almost immediate “review” or “recitation.” Learning

consists in achieving a new level of performance. But this new level is often lost if the new concept learned is not almost immediately put to work.³¹

Now the simplest way to put it to work is to try it out. If it is a bit of information, use it in answering a question. If no one asks a question calling for that information, ask yourself one. If you have gained a new understanding of certain concepts, try solving a problem by means of the new concept. If you cannot do it any other way, you can help to make the new insight permanent by restating it in your own words. Even a formal test has been shown—in experiment after experiment—to be an excellent *learning* device and one which very favorably influences permanence of learning. This is, apparently, independent of the already discussed advantage to be gained from knowledge of results. In practice, however, the two advantages combine to make a very strong argument for repeated appraisal.

But not exclusively by the teacher! Not even mainly. Pupils must learn to check their own learning, step by step. In careful study or where the material is especially difficult, it is probably wise for the student to review his learning after every paragraph, certainly after every section, and again at the conclusion of larger units. This constant checking up on themselves is one of the outstanding ways in which good students differ from poor ones in their study habits.

The Strategic Spacing of Study Periods.—Another principle of some direct, practical importance concerns the “distribution of practice.” Where something has to be learned “by heart,” enduring retention is most economically attained if the repetitions are spread out over a considerable time. Cramming for examinations is thus certainly inefficient if any long-time learning is the criterion. For “permanent” learning, short intensive reviews at increasing intervals are most effective.³² Indeed it is likely that nothing is very permanently learned unless such review or practice is in some way or other provided by the circumstances of one’s life.

True, many psychologists hold that when a thing is once learned, it is never forgotten unless interfered with. According to their view, which is supported by much evidence, the function of reviews is

actually to ward off interfering associations.* The practical conclusion for ordinary learnings is, however, the same—spaced reviews or repetitions of the desired learning.

The principle of distributed practice is sometimes invoked to prove that three-day-a-week classes are better than five-day-a-week. Here, however, we meet a whole flock of confusions. In the first place, distributed practice has not been shown to favor “logical” or “substance” learning; the slight evidence is even adverse. More important is the fact—too often ignored by teachers—that not all of a student’s learning is done in class or is closely paced by the class meetings. Finally, most of what happens in a classroom is surely not repetition or review but the acquisition of new insights. (Or is this an over-optimistic view of teaching?)

The problem of the best spacing of class meetings, like most other complex educational problems, is thus more profitably attacked by direct experiment in the practical situation rather than by dependence upon general principles derived from much simpler situations. Not that we should be so naïve as merely to measure the amount of learning in three-a-week and five-a-week classes! For it is well known in college circles that instructors increase assignments in the former so that one does about the same amount of studying for a three- as for a five-hour course. The moral, one is sorry to say, is rather too clear to Mr. Average Student. The result is a still further complication of the comparison by the fact that three-hour courses are more likely to be elected by superior students. Direct experiment in complex practical situations is thus not easy; but when it is carefully and critically done, it yields conclusions much more safely applied.

The Results of Schooling.—A proper application of the principles just briefly reviewed and of others would doubtless work a very considerable improvement in the retention of school achievement. Investigation certainly seems to indicate that improvement is needed: A 25 per cent loss in grade school history in a little over a year; a 30 per cent loss in high school chemistry in two years and a 50

* According to this view, the “memories buried in the unconscious” receive a less mystical explanation; they are isolated from interference in one way or another.

per cent loss in college botany; college students, business men, and statesmen who cannot spell as well as sixth graders (this is not actually proved as the other figures are); and college professors who have forgotten how to do square roots. The Carnegie Foundation³³ survey of the effect of college study—or rather of college attendance—yields a gloomy picture of the educative process.

Before we get too discouraged, however, one question may be asked: Is it clear that we really want or need to retain much of what we learn in school or college? Frequent review—and use, we noted, is the best kind of review—is a splendid means to enduring retention. Does not the fact that we forget so much of what we studied in school rather argue that we use it little? Critical examination of some of the items in school examinations inclines one to blame the unrealistic character of a curriculum out of touch with modern needs for the poor retention disclosed quite as much as the teaching or the learning. Who cares that we have forgotten how to extract cube root?

Perhaps, in other words, the meager results of schooling are due to too exclusive attention to only one kind of result. We have already admitted—or insisted—that our intellectual advancement is in part dependent upon acquiring, and retaining unchanged, certain skills or certain items of information. But surely it is only a small part. In the writer's experiments³⁴ it was found that pupils can often answer a larger percentage of questions dealing with the "substance" of a passage after a month than they could immediately after it was studied. Instead of forgetting there is what is technically called reminiscence. Indeed even 90 days later, forgetting and reminiscence practically balance one another.

In similar fashion, Tyler³⁵ found that while factual tests in zoology showed losses of 20 to 70 per cent in fifteen months, ability to apply zoological principles to new situations showed no net loss at all. The rather considerable permanence of attitude changes as a result of seeing just one motion picture may be in part a similar phenomenon.³⁶

What we need, apparently, is to conceive of learning and education in somewhat less rigid terms. Certainly Bartlett's³⁷ interesting experiments show that memory is not the static phenomenon it has

usually been considered. We do not so much *retain* experience as *reconstruct* it. It becomes, with the passage of time, simpler, neater, more compact, more significant—and more usable. And speaking more generally, in the education of the near future we shall less frequently ask what a person has got out of his education; rather we shall ask, how has he changed as a result of education.*

Transfer of Training.—With this last statement we have opened up the thorny question of the transfer of training. In effect we have asserted that the meaning of education is this: That we train a man in one situation so that he improves in his behavior in some other situation.

In this very broad sense, transfer of training becomes almost synonymous with education; for the purpose of education, as Pressey says, “is to prepare for meeting situations which must inevitably differ in many respects from the educational situation in which the preparation was acquired.” And there is very real reason for keeping in mind this wider meaning.

Historically, however, the problem of transfer grew up with a narrower connotation to which we may give some attention. Can a person gain a sort of general mental discipline from the study of certain subjects like Latin or mathematics, or from a special kind of training in fortitude as in initiations? Does the study of Latin tend to give a person increased sensitivity to literary and esthetic values, help him to think more clearly or express himself with greater vigor? Do athletics build character in participants which carries over to everyday life? Or, for that matter, does the study of educational psychology help to make one a better teacher?

The problem of transfer is particularly acute in the case of Latin because, of course, save for a very tiny minority Latin has no direct value; it must justify itself in the curriculum, if at all, in terms of its transfer value. It should be recognized, however, that only in degree is this more true of Latin. Latin is carrying the ball for the whole team of traditional school subjects. Latin is not spoken today. But the average student of high school French or Spanish meets no

* We shall not be content, however, as some are today who accept this view, to guess at these changes; we shall insist that they be measured. For only in this way can we be assured that they have occurred.

practical demand to speak the language he so painfully studies for three years—thank the merciful heavens! Navigators must know spherical geometry; do any of the rest of us need it? Is it not just as much a “dead language” as Latin? Civics, of course, is directly practical—in intent. But is there evidence that its study actually makes anyone a better citizen? Indeed if Latin has *no* “disciplinary value,” all education is in a bad way.

The Real Problems of Transfer.—We can better see the answer, however, if we put the question in quite a different way. We need not ask whether any subject has “transfer value.” Of course it *has*, since any experience one lives through changes one’s nature, for better or worse. We can ask, however, (a) specifically what does one do better or worse as a result of a particular course of training or study; (b) whether this course helps (or hinders) more than others; and (c) most important and usually neglected, how can one best increase the transfer effect?

We have perhaps the clearest data for the answer of such questions if we take as an example the effect of a study of Latin on ability in English. Specifically, we may ask whether Latin increases the student’s English vocabulary? (Question (a) above.) Are there other subjects which affect vocabulary more? (Question (b).) Can one teach Latin so as to increase the transfer to English vocabulary? (Question (c).)

A number of experimental precautions must be observed in seeking the answer to these questions. Most of the older investigations, having neglected these precautions, are very unreliable. But Thorndike and Ruger³⁸ showed quite clearly that Latin does influence the English vocabulary. After a year’s study of Latin, there was a gain of 22 per cent on a brief but fairly reliable test of words of Latin derivation. Non-Latin students who were otherwise comparable showed a gain of only 8 per cent. On words of non-Latin derivation, however, the students not studying Latin were slightly superior.

The last result strengthens our belief that the superiority first mentioned is really due to Latin study. It also shows just what the study of Latin does and does not do for English vocabulary. The

study of Latin does not develop some mysterious "language sense." It increases the grasp of words derived from Latin but not of other words.

But how about the second question? Is this gain from Latin any greater than might be derived by other means? Sometimes, certainly. One investigation³⁹ even showed that Latin did *slightly* more for vocabulary than the regular English class.

And this brings us clearly to the third question. Can transfer be increased by a shift in the teaching emphasis? Apparently, yes! For both English and Latin did more for English vocabulary where there was emphasis upon word study. It may seem at first that this is not a question of transfer at all. The pupils merely learned words because they were taught words. This is not quite the case, however. The gains were for words not specifically taught in the Latin course in the form actually tested. When one learns to recognize the word *reducible* from a study of *re-ducere*, there is really some transfer.

Other investigations bring out the fact that the transfer is greater when the pupils are taught to analyze both Latin and English words, get some idea of how words are formed, and are alert to the possibilities of detecting the Latin in the English word. Transfer, in short, seems to depend upon a kind of generalization, upon knowing how to apply general principles.

How Transfer Is Obtained.—There are many ways to secure generalization, and they are not equally efficacious. Overman's⁴⁰ study of transfer in arithmetic is illuminating at this point. The experimentation was very carefully controlled to test the respective merits of four methods of teaching the addition of two-place numbers in the second grade. The four methods may be briefly described as follows: (I) Demonstration: The children were simply shown how to do the additions and given practice. (II) Generalization of Procedure: The pupils were helped to formulate general rules of procedure, such as the keeping of columns straight, and these rules were constantly referred to during practice. (III) Rationalization: The pupils were given reasons and principles, such as that it is not possible to add one's and ten's, but the practical application of this in the "rule of straight columns" was not drawn. If a pupil did not

keep a straight column, he was asked to straighten it up, not because "columns should be kept straight" but because "you can't add ten's and one's." (IV) Generalization and Rationalization: This combines the methods of (II) and (III); both rules and principles were discussed. Of course an equal amount of total time was given to each method. Transfer was tested by the addition of three-place numbers.

After what has been said about the dependence of transfer on generalization, we should expect the first method to be the poorest and so it was. But which of the other three is best? All three certainly illustrate the principle of generalization. The present writer must confess that he expected that the fourth, or combined, method would be best. In fact the second was measurably better. The percentage increases in transfer over Method I were as follows: for Generalization of Procedures 45 per cent; for Rationalization 15 per cent; for the Combined Method 37 per cent. Evidently, these second graders were rather ill-prepared to understand even the simple rational principles given them. Perhaps they needed more basic training in certain number concepts before attempting two-place additions. But taking them as they are, one gets better transfer by the simpler sort of "generalization" of Method II than by the more fundamental generalization of Method III.

Formal Discipline.—Were we to stop here, we should give a distinctly erroneous impression of the experimental investigations of transfer. It has been shown that transfer exists, and that one kind of subject matter transfers better than another. But these are precisely the contentions of the traditionalist, of the believer in formal discipline. Nor is he disturbed by the further finding that the amount of transfer is greatly dependent on teaching methods; he might even claim with some plausibility that the teachers of disciplinary subjects are more likely to teach for transfer, to strive for generalization from the disciplinary subject to life situations. Our discussion of the experimental facts thus seems to favor the contentions of the classicist.

Yet as a matter of actual fact, the trend of investigation is quite distinctly adverse to the traditional claims for formal discipline;

because the values obtained, though real, are invariably small. Latin does help one to learn French, but not nearly so much as the same effort spent on French itself; and similarly all along the line. Nowhere is the value of quantitative measurement more strikingly evident. Every contention of the traditionalist is qualitatively justified but *quantitatively revealed as unimpressive*.

Space, of course, does not permit us to cite all the evidence for this rather sweeping generalization. The evidence is very considerable and not to be brushed aside merely because one does not like it. Until other evidence is produced to the contrary, we may fairly conclude that no subject can justify its place in the curriculum in terms of its transfer value alone—transfer being taken in the narrower sense just discussed.

Applicational Transfer.—There is, however, another aspect of the transfer problem—one which ought to trouble the advocates of “practical” subjects as well as the classicist. Can we get people to carry over what they have studied at school into everyday life? Will the study of hygiene—or even the dramatic toothbrush drill—cause children to brush their teeth at home more regularly? Will study about the devastations of forest fires lessen the number of fires due to human carelessness and thoughtlessness? Will the more favorable attitude toward a minority group which comes from a motion picture result in more actual understanding of one’s neighbors? Here again the question is not so much, “Does transfer exist?” but, “How can we make transfer greater?”

Experimentation in this field has barely been begun; one predicts that twenty years hence the techniques of securing applicational transfer will occupy the central place in any discussion of educational psychology. What data we have indicate that the principles of transfer from subject to subject hold for transfer from the classroom and the study to practical life. Transfer depends upon intelligent effort directed to that end. Transfer depends on teaching for transfer. This means that the opportunities to use what is being learned must be specifically and fully considered. The teacher must forget his “ivory tower” and direct his efforts to the improvement of pupil behavior in the whole sweep of life activities.

OMITTED TOPICS

A Concluding Section.—This volume is intended to help orient the student to the multifarious activities of contemporary psychology. As one looks back at this chapter now that it is written, one has a renewed sense of its many omissions. Whole areas of educational psychology to which scholars are devoting their lives are not even mentioned or are treated only by implication. It has seemed worth while, therefore, to bring together here a list—just a bare list with almost no attempt at system—of topics which the interested student will find treated in textbooks of educational psychology, some in one, others in other texts. Even this list is, of course, very incomplete.

There is first a cluster of topics about the general subject of individual differences and the problem of treating pupils differently in the light of their differing natures: Special abilities and disabilities, exceptional children (the unusually bright or dull, the delinquent, the emotionally unstable, the crippled, etc.); the problems of teaching and of educational and vocational guidance in relation to differences—in interests, attitudes, ideals, sentiments, and aptitudes.

Then there is a cluster of topics concerning primarily the teacher's activities: Authority and discipline, the mental hygiene of the school-room, the maintenance of effective general conditions for learning, and the social psychology of the classroom.

Lastly, there is a group of topics concerning the outcomes of schooling: The whole range of problems involved in educational measurements and the appraisal of progress; the psychology of learning as applied to specific subjects; motor and manual skills, creative activities, thinking, character, the prevention of personality maladjustment, and the promotion of happy personal living.

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CHAPTER VI

THE CONCEPTS AND METHODS OF SOCIAL PSYCHOLOGY

By DANIEL KATZ, *University of Michigan*

Social psychology is a relatively late chapter in the story of psychology. At first psychologists were content to investigate man as a biological organism responding to changes of energy in the physical world called stimuli. Today an increasing emphasis is being placed upon man in relation to his fellows. Social psychology is that field of psychology which deals with living creatures as they affect and are affected by their fellows.

Social psychology thus treats many of the problems of the economist, the political scientist, the anthropologist, and the sociologist. But while these specialists are concerned either with the end result of social interaction or with generalizations about social events which are independent of individual human beings, the social psychologist concentrates upon the principles of human behavior involved in wars, depressions, strikes, elections, and other social happenings. The economist describes the business cycle in terms of commodity prices, car loadings, market fluctuations, and other indices of economic activity. The psychologist turns instead to the buying and selling habits of human beings and to their motives in buying and selling.

THE NATURE OF HUMAN GROUPINGS

In dealing with men in relation to their fellows our first inquiry may well concern the nature and type of human associations. There are many different kinds of groups. An individual belongs to a fraternity, he associates with a certain clique, he comes from the right side of the railroad tracks, he is a member of a certain church, etc. It is essential to analyze the nature of various groupings so that we

do not confuse different facts of social relationship by merely calling them all groups or associations. To help in this analysis the following six criteria may be usefully employed.

The Objective or Subjective Definition of Groups.—A common source of confusion in talking about the group characteristics of people is the failure to describe clearly the basis of group description or definition. Thus the practice is to use the term *group* in at least four ways; people are grouped together on the basis of (a) a common objective condition such as geography or income, (b) a common set of values and attitudes such as liberal or conservative beliefs, (c) similar behaviors or roles such as working in a factory, and (d) a common feeling of belongingness such as the conscious identification of the students in a university with their group.

Many social-science accounts of human groupings seize upon some objective fact which is common to a number of people as a basis for calling them a group. All people living within a geographical area are grouped together, as, for example, Southerners or New Englanders. Or the common objective factor may be skin color, or age, or income. There can be no objection to such classification of people into groups, if the basis of the categorization is clearly understood. Frequently, however, the assumption is made that these groups are psychological in the sense that they have common ideas, ways of thinking, or even a feeling of consciousness of kind. Now it is a mistake to assume without evidence that these objective groupings are psychological. The extent to which subjective commonality does exist must be determined by a direct study of the likemindedness of the group in question.

Many analysts of contemporary affairs have assumed that before, during, and after World War II the American Midwest was isolationist, whereas the people on the Eastern Coast, and to a lesser degree on the Western Coast, were internationally minded. Public opinion surveys have shown, however, that the regional differences on questions of foreign affairs and international relations have been and are relatively slight. Some differences can be found, but they are far from the magnitude that would enable us to predict the attitudes of individuals toward the United Nations or toward inter-

national cooperation, if we knew only the geographical regions in which these individuals lived.

The whole question of whether there are social classes in America depends upon how social class is defined. There have been marked differences in income and in education in the American population for a long period, but this does not in itself mean that we have an owning class or a working class with distinctive values and a feeling of consciousness of kind. The research results concerning socio-economic status will appear at a later point in the discussion.

On the psychological side we group people together when they have identical or similar beliefs and attitudes. The purest form of psychological grouping, however, is the fourth category mentioned above, of conscious identification with the group which involves the perception by the individual of his similarity to his fellows. The sociologist F. H. Giddings, in the early development of social psychology, called this "consciousness of kind."

The concept of "reference" group of T. Newcomb and M. Sherif has recently come into usage.¹ Reference group describes the fact that people frequently use as a frame of reference for their ideas and actions the group with which they like to identify themselves. This is not so much the group in which they have formal membership as the group to which they think they really belong.

Partially and Totally Inclusive Associations.—A second criterion for analyzing groups is furnished by Allport's distinction between *partially inclusive* and *totally inclusive* associations.² Some groups include practically all of the individual's personality. Other groups may include only a segment, or fragment, of the individual. For example, a professional ball player may live his life in terms of his ball club. He eats, drinks, and sleeps baseball. The baseball league, to which he belongs, is for him a totally inclusive grouping. He has relatively few interests outside of it, and these are of minor importance. If we know him as a baseball player, we have an adequate description of his personality. On the other hand, the professional joiner may belong to a score of organizations. A small fraction of his interests is given to his golf club, another small fraction to his political party, and still another fraction to his church. Each of these

groups, however, includes only a small part of the man. If we saw him in any one of his group roles we would know very little about his personality.

Perhaps it is wiser not to distinguish sharply between a wholly inclusive as against a partially inclusive grouping. Instead we should use this criterion as a scale of more or less inclusion. Thus the baseball league may include 90 per cent of the ball player's activities and interests. The professional joiner may give 10 per cent of his time to his golf club, 2 per cent to his church, and 1 per cent to his political party.

It is also important to include a qualitative consideration when we use this criterion of how much of the individual's personality is included in a given association. An individual may give relatively little time to a group and take part in few of its activities, and yet his ego may be deeply involved in it. Practical considerations of making a living prevent him from playing the role he otherwise would. In addition, therefore, to describing the time and activities as a measure of inclusion we need to know the intensity of the attachment to the group.

Primary and Secondary Groups.—Another dimension to consider in describing groups is their primary or secondary character. One of the founders of modern social psychology, C. H. Cooley, emphasized the difference between a group in which all the members were physically present, and hence could directly stimulate and respond to one another, and a group in which the members were not physically present.³ The family belongs in the former category, whereas the members of a political party most of whom do not come into contact with one another comprise a secondary group. The child learns first to adjust to primary groups. Secondary groups later exert their influence in part because of the social conformity and the social controls developed in the face-to-face social situations.

Some psychologists have been so impressed by the importance of the primary group that they see the secondary institutions of a society as the extension or reflection of the particular family pattern. The old authoritarian German state is thus sometimes regarded

as the extension of the authoritarian German family. But as anthropologists have pointed out, the primary institutions are partly determined by the secondary institutions in a society so that there is a mutual interaction between the two types of groupings. Nevertheless, it is important in studying groups to have some measure of the extent to which the group is an immediate face-to-face affair and the extent to which it depends upon remote controls.

The Degree of Institutionalization.—A fourth criterion is the degree to which the actions and attitudes of the people in the group are *institutionalized* or standardized according to the roles they play. In any social institution the freedom of personality expression of the members is restricted by status and role. Probably the most institutionalized patterns of behavior are found within the army, but even in a college the person who happens to be a dean or a professor or a freshman has a set part to play which may be independent of his personality make-up.

The degree of institutionalization of group behavior can often be measured on a scale of conformity to the accepted pattern. The resulting measurement assumes the form of a J curve. The steeper the slope of the curve, the greater the institutionalization of behavior. Now in the measurement of biological or personal traits the rule is a normal distribution curve with most people in the middle but with considerable variation on each side of the mode. F. H. Allport and his students have demonstrated, however, that measurements of conforming behavior in religious, political, and economic institutions reveal a high degree of uniformity with only occasional deviations on one side of the mode.⁴ For example, most members of a church when questioned about their belief in a Deity will accept the official theological doctrine of their church with fewer and fewer deviants the further one departs toward the agnostic part of the scale.

The totalitarian state attempts to regiment all thought and action into prescribed channels and represents one end of the scale of institutionalization. The anarchist's dream of a completely free society with no authoritative norms represents the zero end of the scale. One of the central questions of our time is the determination of those

areas in which we want social norms binding on everyone and those areas in which we desire latitude of personality expression.

Group Relationships.—A fifth criterion is the kind of structural relationship within the group. F. H. Allport has distinguished between the *co-acting* group in which the members play parallel roles and respond primarily to a common stimulus-source and the *inter-acting* group in which the responses are primarily to one another.⁵ Groups also vary in the number and types of reciprocal roles, in the cooperative or authoritarian pattern between leaders and followers, in the complexity of organization, in the polarization of a common pattern of values or of action. The charting of the structural relationship of groups is still in its beginning stages in social psychology.

Permanence of a Group.—A sixth criterion is that of *permanence*. How long do the relationships between people last? A crowd is a temporary group. People stay together in a crowd for a few hours and then may never see one another again. The nation as a secondary grouping is relatively permanent. Obviously some degree of permanence is necessary, if we are going to speak of groups at all. The more stable and the more permanent the group, the more we are justified in using it as a concept in social psychology. Older writers were so impressed with the permanence of the human relationships which constitute the group that they regarded the group as of the same type of stable unity as a biological organism. The state for them was an entity with the same reality as the human being. Its parts were individuals just as the cells of the body are parts of the individual. As a matter of fact, however, groups lack the permanence of individuals and so cannot be considered entities. After all, individuals can leave one group and join another, but cells do not wander away from the human being and become part of another person. Therefore, even though we do get in the habit of speaking of a group as an entity, we must always be alert to watch its stability. Otherwise we may wake up to find the group has vanished overnight as did the German labor unions after the advent of the Nazis to power.

THREE SOCIAL GROUPINGS

With the aid of these criteria we can now turn to consider three very important groupings in our society: *The community, the public, and social classes.*

The Community.—In popular usage the term community is indiscriminately applied to any group with certain common interests. In social science, however, community refers to a definite type of human association. It refers to a number of people living together within a short radius whose psychological needs are for the most part satisfied within the group itself. The rural village sixty years ago was a good example of a community. The radio, the automobile, and the chain store have broken down the old village barriers so that it is hard to find a pure community today. Neighborhood sections in large cities, the faculties of some colleges, and the officials of some business organizations sometimes approximate the community type of grouping.

The community is essentially a *primary* grouping. Not all of its members are in face-to-face contact with one another all the time, but the possibility of face-to-face contact is great and all members are known personally to one another. The community is also a *totally inclusive* group. Within its boundaries the members express their personalities and satisfy their needs. People do play roles in the social life of the community which are not without their standardized aspects—instance the village philanthropist, the village fool, the village gossip. Nonetheless, people tend to find the role which suits their personality within the community. The village busybody creates her own part and so, too, do the other community characters.

The relations within the community, therefore, are many and varied. They vary according to the personalities of the individuals and according to the patterns of association. Friendship, enmity, tolerance, derision, cooperation, and noninterference appear between different people and at times between the same people. Toward the outsider, however, is a universal feeling of mistrust and mild hos-

tility. This general attitude does not govern every action, for if a person appears as a visitor he will be treated hospitably. If he comes in any other capacity, however, he finds the community solidified as an in-group against him. The community is a relatively permanent grouping. Since it is based upon personal contacts between its members, there is a strong tendency for it to survive as long as these individuals live.

At present the community grouping is found less frequently than in the early days of our culture. We were once a nation of communities. Today we are a nation of publics. Members of the older generation are apt to bewail the good old days of the community. This is largely because they spent their childhood in this personal type of living. As adults they find it hard to adjust to a less personalized social life and they look back with a nostalgic longing to a golden age.

Publics.—At the opposite pole from the community stands the public. A public is a group of individuals who hold in common some interest or some attitude or some emotion. Practically the number of publics seems unlimited. There are as many possible publics as there are human interests and attitudes. In our culture the supporters of Townsend's Old Age Pension Plan constitute one public, the radio audience of Charlie McCarthy another, the readers of *Life* still another, the members of the Democratic Party a fourth, the buyers of Ford cars a fifth, and so on.

The public is generally, although not invariably, a *secondary* group. Its membership transcends the spatial limitations of direct physical stimulation. A coal miner in Illinois and a store owner in Jersey may both belong to the same political public. More important than the criterion of the primary or secondary nature of association in describing the public is the criterion of the degree of inclusion of the individual's personality. The public is almost always a *partially inclusive* group. A person enters into a public with but a segment of his personality. Hence he can belong to many publics but to only one community. The number and variety of publics to which a man

belongs is an index of the extent and variety of his interests and sometimes of the integration or lack of integration of his personality.

The relationship which characterizes a public is the polarized attitude of acceptance or submission to a common stimulus source, found in almost all audiences. The common stimulus source may be a leader, such as Townsend, a radio program, or the object of people's material desires. There is little reciprocal interaction between members of the public. They intensify one another's allegiance to the group through the facilitating effect of numbers, but extended give-and-take between members or between leaders and followers is lacking.

The public is a relatively impermanent group. Since it competes with many other similar publics for the time and support of the same people, any one public may disappear with startling quickness. Some publics do endure but the average public does not have a long life.

In general it is useful to distinguish between two types of publics: the *interest public* and the *identification public*. The interest public is a group of people with a common economic motive. The retailers association is an interest public; so, too, is the National Manufacturers' Association or the consumers' union. An identification public, on the other hand, is a group of individuals who ally themselves with a leader or symbol to enjoy vicariously a success not easily available to them in their own lives. The sporting public, who follow the fortunes of a particular prize fighter or a particular baseball team, identify themselves with their heroes and so participate in the victories of their champions. Identification publics thus can flourish only in an age when many people are thwarted in living the type of life they would like to live. Vicarious enjoyment through identification takes the place of direct satisfaction with life itself.

The proper analysis of publics enables us to predict the outcome of social trends. The mistake is frequently made of regarding publics as vague forces or as entities in and of themselves. Before an election it will be assumed that Candidate A will be elected because he has the support of the Ku Klux Klan, the American Federation of Labor, the Republican Party, and the advocates of a new prohibition

law. This assumption obviously overstates the strength of Candidate A because these groups are overlapping. Moreover in each of these publics are individuals who belong to other publics which may oppose Candidate A. Then, too, people have ideas and convictions of their own which are not merely the algebraic summation of the membership fields of the various publics. John L. Lewis took a strong stand, for example, against President Roosevelt, but on election day a majority of his coal miners still voted for F. D. R. To predict, accurately, we must regard publics not as entities but as forces within the individuals who are also subject to other influences. Moreover, it is necessary to measure in advance the relative strength of the allegiance to different publics of the same individuals. Will John Jones, a lifelong member of the Democratic Party and also an ardent labor man, vote for a Democrat who is nonlabor in preference to a prolabor Republican?

Social Class.—Somewhere between the community and the public should be placed the grouping called social class. Social class is both a primary and secondary group. Farmers as a social class include both the local group of intimate associates and fellow farmers distributed over the whole country. The primary aspect of this grouping brings home to each individual the similarity of interest and the identity of attitude through a common way of life.

Social class is closer to the community than to the public with respect to the criterion of inclusiveness of personality. In modern society members of a social class belong to other groupings as well. Hence social class is not totally inclusive. Nevertheless, in terms of the intensity of the involvement of the individual's personality social class is not to be compared with the public. The test of a social class is whether it involves the central basic attitudes of personality. Other group memberships are generally abandoned when they clash with membership in the social class. One reason for holding that social class in this country is relatively unimportant as compared with Europe is that members of the alleged social classes in the United States follow other than class allegiance in general behavior and attitude.

The relations within a social class are those of equality as Ginsburg points out.⁶ Toward other classes the relation is one of inferiority or superiority. The upper classes expect and receive deference from the lower classes. Within a class, attitudes of superiority shown by one man toward his fellows are regarded as bad manners or an attempt to renounce his class.

In our political democracy with its emphasis upon equality we are slow to admit the existence of social classes. Much of the debate about the existence and significance of social classes has been due to a failure to differentiate between the objective and subjective bases of groups. The older classical treatments have taken objective difference in income or in the objective role people played in the production process (whether wage worker, owner, or middle man) and have made these real differences in economic status or role the definition of social class. But they have neglected the psychological or subjective aspects of group membership and have assumed that a common psychology and group consciousness necessarily accompany the objective differential. On the other hand more mentalistically inclined writers have ignored any differences in objective economic status or behavior because of the lack of conscious class-identification.

Research findings have been accumulating, however, which remove some of the speculation about the existence and significance of socio-economic groupings. They indicate (1) that widespread differences in income assume a pyramid form in our society, (2) that these income differences show a fair degree of stability at the group level over a period of time, (3) that these differences are accompanied by characteristic differences in behavior, in attitudes, in values, and (4) that differences in socio-economic status have not reached the point where there is a universal identification with social class.

Studies of income distributions in the United States show that both income and financial holdings assume the form of a pyramid—that is as we ascend the pyramid we find fewer and fewer people in the higher wealth categories. One study in 1935-36 gave the following results:

DISTRIBUTION OF INCOME, 1935-36 ⁷

	<i>Per Cent</i>
Over \$10,000	1
\$5,000-10,000	2
4,000-5,000	1.4
3,000-4,000	4
2,000-3,000	13
1,000-2,000	37
Under \$1,000	42

More recently a study by the Michigan Survey Research Center for the Federal Reserve Board found a similar pattern of income distribution.⁸

DISTRIBUTION OF INCOME, 1946 ⁸

	<i>Per Cent</i>
Over \$7,500	4
\$5,000-7,499	6
4,000-4,999	8
3,000-3,999	17
2,000-2,999	25
Under \$2,000	40

The Survey Center study found a related pattern for people's liquid assets or savings:⁹

TOTAL LIQUID ASSETS HOLDINGS, 1946

	<i>Per Cent</i>
\$5,000 and over	6
2,000-4,999	12
500-1,999	29
1-499	29
None	24

More important, perhaps, than the nature of the distribution of income is the stability of these income groupings. If people can move up and down the economic scale readily, these income-differentials would not make for permanent psychological group differences. The high degree of similarity in income distribution between depression and boom years as well as the small numbers of people in the upper brackets would suggest a fair degree of stability. Precise data for the country as a whole are lacking, but two limited studies are especially pertinent to the problem. One investigation of the male population in San Jose, California in 1936 found that 75 per cent of the people in managerial, professional, clerical, and farm owner groups had fathers in one of these groups. A similar study in Poughkeepsie, New York, in 1941 gave almost identical results.

The evidence suggests, then, that economic groups do exist in America and they show considerable, but far from complete, stability. Compared to Europe, education and opportunity are available to many more members of the lower-income groups. In absolute terms, however, the chances for the realization of the Horatio Alger theme of upward mobility are not as good as the chances against it.

The significance of income groups becomes apparent when we attempt to predict the political and social beliefs of people. At various times in American history socio-economic movements have affected political behavior as in 1896 when William Jennings Bryan, representing the agrarian movement for free silver, drew heavy support at the polls from the underprivileged groups. There is no direct quantitative evidence, however, to show the exact relationship between economic groups and political attitudes before the public-opinion polls began to canvass cross-section samples of the whole nation in the 1930's. We do know, however, that the voting behavior through the 1920's was not highly correlated with income because of the history of the *Literary Digest* poll. In the twenties this poll was able to predict state-by-state voting behavior with a sample heavily overloaded with upper-income ballots. By 1936, however, voting behavior was definitely correlated with income, and hence the *Digest* upper and middle class sample was woefully inadequate in predicting how the lower income groups would vote. During the four presidential elec-

tions from 1932 to 1944, income was one of the important predictors of voting behavior. The following figures from the Gallup poll illustrate this fact in the 1936 and 1940 elections.¹⁰

THE VOTING BEHAVIOR OF INCOME AND OCCUPATIONAL GROUPS

	<i>Per Cent for Roosevelt</i>	
	<i>1940</i>	<i>1936</i>
Income:		
Upper Income (\$50 and over per week)	28	42
Middle Income (\$20 to \$50 a week) . . .	53	60
Lower Income (less than \$20 a week including all relief categories)	69	76
Relief, WPA, & Old Age Assistance . .	80	84
Occupations:		
Business	34	47
Professional	38	49
White collar	48	61
Farmers	54	59
Skilled labor	59	67
Semi-skilled	67	74
Unskilled	69	81
All labor	66	74

Political and social attitudes as well as voting behavior are related to economic status as Kornhauser's 1937 study demonstrated.¹¹ He found that the various income groups differed significantly in their attitudes toward government ownership of big industry, support of labor unions, governmental policy toward the distribution of wealth, approval of the New Deal, and similar issues.

Public-opinion poll results consistently report the same findings on a variety of questions ranging from socialized medicine to the sit-down strike with greater support for the status quo coming from the upper-income groups. The most comprehensive study of these relationships is that of R. Centers¹² who employed a scale of

INCOME LEVEL IN RELATION TO ATTITUDES ON SOCIAL ISSUES
(Based upon a sample of Chicago men)
Kornhauser Study

Questions	Income Levels				
	Over \$5000	\$3000 5000	\$2000 3000	\$1000 2000	Under \$1000
(1) In general, are you in favor of the New Deal (the policies of President Roosevelt and his advisers)? Yes (per cent)	38	59	70	79	83
(2) Do you think the government should let the business system alone as far as possible? Yes (per cent)	86	74	74	70	66
(3) Are you in favor of strong labor unions to which almost all workers would belong? Yes (per cent)	28	39	65	75	84
(4) In disputes between working people and employes do you usually side with the workers, the employers, or neither? With "workers" (per cent)	15	28	47	57	63
(5) Do you believe the government should aim at making people's wealth and incomes more nearly equal? Yes (per cent)	38	44	60	72	81

radicalism-conservatism and related it to income, to occupation, and to conscious identification with social class. His results confirm the earlier findings of Kornhauser.

The data on conscious identification with social class are not, however, as consistent as the relation between attitudes on social issues and income level. Kornhauser's Chicago group accepted the proposition that there is no working class in America. A clear majority of the lowest income group (64 per cent) subscribed to the statement that "Working people and their children can rise to better

ATTITUDE DIFFERENCES OF URBAN OCCUPATIONAL STRATA Centers Study

	<i>Per Cent Voting Yes</i>		
	<i>(1) Is private ownership of business preferable to government ownership?</i>	<i>(2) Is it more important for the government to insure individual enterprise than to guarantee a decent living standard?</i>	<i>(3) Would we be better off if we gave the working people no more power than they have now?</i>
Large business	97	90	75
Professional	82	77	65
Small business	83	76	63
White collar	83	68	50
Skilled	77	53	31
Semi-skilled	54	30	15
Unskilled	52	33	28

positions; they do not have to remain ordinary workers." And the overwhelming majority of all income groups felt that compared to themselves, the chances were good that their children would have a higher position and be better off. H. Cantril, in a national sample, found that 87 per cent of the people felt that they belong to the middle class when the choice was between upper, middle, and lower.¹³ The Centers study, however, gave the following results when the alternative *working class* was included in the question:

PERCENTAGES OF POPULATION AFFILIATING WITH EACH SOCIAL CLASS

Upper class	3
Middle class	43
Working class	51
Lower class	1
Don't know	1
Don't believe in classes	1

Both the Cantril and the Centers findings are undoubtedly affected by the specific question employed. When people had to

choose in the Cantril study between upper, middle, and lower, very few of those identified with working class cared to characterize themselves as lower. On the other hand, in the Centers study many people checked working class in that they thought of themselves as gainfully employed without having much conscious class identification. The Kornhauser question with its more meaningful statement about class-stratification is probably correct in predicting the psychology of the American worker as believing fairly strongly in class mobility.

An interesting result in the Centers study was that social attitudes could be predicted more accurately if the objective fact of occupation were combined with subjective affiliation of social class than if either occupation or subjective affiliation were used alone. This indicates that the subjective feeling of consciousness of kind is far from complete among economic groups or else the prediction would not be raised by including the mere fact of occupation. Although income, occupation, and class identification all correlate well with many social attitudes, these correlations are not of the highest order, that is, there is not a one-to-one relationship. There are still people in the lowest income group who are conservative and people in the highest income level who are radical. Kornhauser attempted to get at one psychological factor by asking questions about personal satisfaction and feelings of adjustment. He found in general that personal discontent is a determinant of the radical views at the upper-income levels, whereas it is only a secondary influence among the lower-income groups. The research to date suggests that economic determinism is *an* important factor in the beliefs and attitudes of Americans, but its effect is mediated through other psychological influences in the individual, and that a *simple* economic determinism will yield incorrect answers.

Important, too, in the consideration of social class are the studies which show the different social environments affecting the child growing up in the various socio-economic strata. Allison Davis, on the basis of field studies of small cities in New England, the deep South, and the Midwest, concludes that social class constitutes something of a separate sub-culture within which the developing child becomes socialized.¹⁴ He reports that the middle-class compared to

the lower-class imposes much more rigorous training upon children, with more emphasis upon sacrifice and renunciation for future gains. The typical motivation in this group is more anxiety-dominated with its fear of the deprivations of low status and its eagerness for the security of higher status. M. C. Ericson has substantiated the greater rigors of child training at the middle-class level in a quantitative study of histories of training procedures for 107 middle-class children and 167 lower-class children.¹⁵ The middle-class children underwent a stricter regime. They were weaned earlier; cleanliness training started earlier; they had to adjust to stricter feeding routines; and they had to assume responsibilities in the home at an earlier age. Clearly, the importance of social class needs to be studied genetically in the socialization process of children as well as at the adult level of political and social attitudes. Adult personalities are affected directly and indirectly by both the content of childhood socialization and the manner in which it is carried out.

The Groupings Are Intermingled.—The structure of society is the patterning of communities, publics, and classes within it. To understand how social life operates in any culture it is necessary to break down the complex pattern and see how it is put together. At different periods in history different types of groups predominate. The America of a century ago was a society of communities. Today we are a nation of publics. Many European countries are built about social classes. The social processes in these different setups are accordingly different. In the community era people are controlled and control others through personal opinion, personal merit, and recourse to a common set of beliefs and attitudes based upon a common way of life.

In the period of publics we find the agencies of mass impression like the radio and the newspaper more important. A common set of beliefs grows out of the coordination of information and propaganda supplied from above. Individuals no longer count, and the dominant criterion becomes the quantitative yardstick according to which it is possible to say that this bridge is the biggest in the world, this highly advertised product is used by ten million Americans, this university has the largest enrollment in the world. It is difficult really to know

anyone else although we may be acquainted with the recreation habits, the business activities, and the political attitudes of many actors in the social drama. In this age of the lost individual, public opinion assumes huge proportions as a means of social control, but exactly what this public opinion represents no one precisely knows.

In a society of social classes, on the other hand, individuals are less confused but the social order is more chaotic. The various classes represent opposed interest groups at war or potentially at war with one another. The tug of war between them produces not equilibrium but a seesaw of tensions. Within a given class, however, individuals feel at home as they did back in the days of the community. Again there is a common way of life and a common psychology growing out of it.¹⁶

Rarely, however, do we find a people organized exclusively into any one of these types of groupings. All three groups may be well represented at certain periods in history. Publics, for example, may cut across a community setup and unite like-minded individuals at least with respect to some of their interests. But often a given type of group will prevail and will determine the social processes operative within its boundaries.

SOCIAL INTERACTION

In starting our description with the nature of groups we have done violence to the facts in a certain sense. Historically we should start with men as self-interested creatures struggling to make a living against one another and against the natural environment. Out of this struggle develop the stratified adjustments known as group organizations. Once a grouping has been achieved it exerts a directive influence upon subsequent striving of men after various biological and social goals. It exerts an influence not as an impersonal force but because it is embodied in the habits of people and taken over by their progeny through a process of social learning.

The dynamics which produce group organization are usually described under the heading of processes of social interaction. Men in their struggles to attain their goals do not wage solitary battles against a non-human world. They fight together and against one

Nature
of
groups
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another. Their struggles at adjustment are generally collective in some measure. They may get together to rob a foe or protect themselves against an avaricious enemy. Even an individualistic people carry on a number of activities in cooperative groups.

The Socialization Process.—One of the most significant phases of social interaction is the socialization process—the process by which the raw material of human nature is molded into various cultural patterns. In good part this is equivalent to the study of the development of personality, save that the field of personality tends to be more individual-centered. The socialization process is for social psychology what history is for the social sciences. In fact, Murphy, Murphy, and Newcomb¹⁷ regard it as the central subject matter of social psychology.

In the past sociologists and anthropologists have been inclined to regard the transmission of culture from one generation to another as something of an automatic process. Each generation is regarded as so many empty vessels into which the social norms of the culture are poured. Thus we have continuity in a culture over long periods, with each generation a replica of the past. This interpretation is much too summary, however, and neglects the dynamic two-sided nature of socialization. Human beings are not passive, clay-like creatures who can be easily molded into a given form. They react back in the process and the final resultant personality is a product of this interaction. To regard socialization as the faithful and passive transmission of culture is to overlook an important source of social change.

The neglect in the study of socialization is now being remedied by attention from psychiatrists and anthropologists. The Freudian notion that socialization in its very nature imposes restraints which are accepted only at a psychological cost to the personality has been gaining acceptance. One school of thought relates aggressions in adults to a reservoir of repressed hostility resulting from frustration in childhood. The child meets interference from adults with aggression. As the aggression is punished, it becomes inhibited but is stored up and is displaced on convenient objects or persons. Thus all adult aggression from the scapegoating of Negroes to wars is

explained as displaced hostility arising out of frustration. While this is obviously only part of the story of conflict and aggression, it does emphasize the importance for social psychology of the early socialization of the child.

The most promising contribution thus far to the use of socialization in a broader study of social phenomena is that of R. Linton, the anthropologist, and A. Kardiner, the analyst.¹⁸ Linton has described a number of primitive cultures, and Kardiner has developed concepts for interpreting them psychologically. Kardiner holds that the primary institutions of child care and child training and their related activities are all important in the establishment of basic personality. The basic personality in turn affect secondary institutions such as religion and folklore. Thus Kardiner maintains that we should not seek to establish a relationship between social institutions directly, but rather we should use basic personality as the mediating link between primary and secondary institutions. For example, among the Tanala, a society with absolute authority in the father, with physical punishment to enforce child training, with obedience as the method of adjustment, the growing child generalizes his experiences to the field of religion. The forces in nature beyond his immediate control are treated by the analogy of obedience to an all-powerful father. Since he has no responsibility for manipulating these external forces, he develops a fatalistic attitude toward them.

Whether or not this central thesis of Kardiner's is correct, it is true that Linton and Kardiner have given good descriptions of early childhood development and the resulting personality types. Among the Alorese, for example, the child is neglected by the mother who has to go off to take care of the fields. This pattern of neglect is reinforced all through childhood; no one person is a parent surrogate for the child during the dependent years. His needs are not consistently or systematically provided for. He is punished for showing aggression. Teasing is a common attitude toward children. The resulting personality shows weak ego formation. The Alorese are a defeatist, distrustful people with no capacity for energetic constructive action, with a low aspiration level, with a limited capacity for strong attachments, and with a weak super-ego or conscience.

Processes of Social Interaction.—Four processes of social interaction are generally distinguished: *conflict*, *cooperation*, *competition* and *accommodation*. *Conflict* is distinguished from competition in that in conflict the individuals direct their energies at the destruction or injury of their opponents. In *competition* they often pursue parallel courses of action directed at the same common goal. Their attention is upon getting there first or getting more of the objective. For true competition both parties must agree implicitly upon the rules of the race. *Cooperation* does not imply an altruistic set of motives. It merely describes a joint coordinated effort by two or more individuals. *Accommodation* refers to the settlement of conflict either through the subjugation of one party by the other and a consequent imposition of a master-slave relationship or through a process of compromise.

Societies are sometimes characterized as competitive, cooperative, or individualistic. As a matter of fact all four processes of social interaction (*conflict*, *cooperation*, *competition*, and *accommodation*) occur in every society, although the emphasis upon the several processes may vary. As a general rule even these dynamic processes become channelized in standard patterns. The aggressive impulses which among children are discharged directly in fights with one another are inhibited in adulthood and directed against the enemies of the group—real or imaginary. These aggressive impulses are not the result of an instinct of pugnacity. They are the direct overflow into action of emotions produced through a blocking or thwarting of some desire of the child. In the interests of social living, aggression is limited to certain types of expression, often expression which is relatively harmless or expression against outsiders which solidifies the in-group.¹⁹

The particular conditions which favor competition over cooperation or individualistic conflict over compromise are very complex. Anthropologists have sought an answer in their studies of primitive societies. They find that the frequency of cooperation in relation to competition is not a function of the cultural complexity of the group nor of the type of natural environment in which the group lives.²⁰ It is related to the total complex of natural and social factors in a given society. Thus men may hit upon cooperative devices as the

most profitable means of hunting. The large game they hunt and their limited technical equipment may make hunting under simple competitive procedures almost impossible. Once having developed cooperative hunting habits, however, they are likely to preserve them even after the discovery of weapons which would make individualistic hunting practical. The cooperative practice may remain because, even under the new set of conditions, it is still a good adjustment. This practice has come to be highly valued, and as long as it brings results it is going to be difficult to change men's habits.

Similarly, competition arises out of environmental circumstances, which make cooperation difficult. Hunting small game, for example, may be done more effectively by the lone hunter than by a group of clan-mates. Again, once the practice becomes established in the habits of men they rationalize its objective basis and teach their children competitive values. In other words, the dominant activities of a society cannot always be inferred directly from its natural environment because men need not make the best possible adjustment to a set of conditions in order to survive. Alternative adjustments exist. The particular adjustment which becomes standardized as the institution of the group may survive for a long time, even though better ways of social living are possible.

Sometimes people are so impressed by the way old customs endure that they hold that the only reason for different customs in different groups is the historical accident which originated the custom. This belief overlooks the important fact that customs remain because they do have some psychological utility. When the psychological utility vanishes the custom changes. Men do cling to old customs, but let those customs cease to provide satisfaction of needs and men will find new ways to meet their problems.

Mechanisms in Social Interaction.—The processes of social interaction just described are fairly complex relationships between people. To describe cooperation or competition adequately, reference must be made both to the interacting individuals and their objectives. Social psychologists have also been interested in describing the more elementary mechanisms at work in social interaction. Five such

mechanisms are *social facilitation*, *social inhibition*, *imitation*, *suggestion*, and *identification*.

Social Facilitation.—Social facilitation refers to the increase in speed and amount of activity due to the sight and sound of one's fellows engaged in similar activities. This increase, moreover, is not solely a matter of rivalry. When we are in the presence of co-workers we are actually receiving more stimulation than when we are alone. We eat more in company than in solitude, and we tend to speed up our actions generally when in the presence of similarly-acting individuals. Experiments have demonstrated that people will turn out more work in a room with others busy at the same type of task than they will when alone.²¹ There is even some evidence to show that the best seats for students in lecture courses are not those on the front row but those in the center of the group where the amount of social stimulation is greatest. Certainly in a crowd the people at the fringes do not feel the impulsion to follow their fellows as violently as do those in the center. Every track man knows he can make better time running against competitors than when running by himself against time, even if his time record will be used to qualify or disqualify him for a team.

Although social facilitation means an increase in speed and amount of activity, it does not imply an increase in quality of performance. In fact, experiments show that individuals are more accurate when working alone than when working together. Moreover, research proves that in tasks calling for thought the solitary performance of an individual is better than his performance in a co-acting group. The most desirable conditions for taking an examination would include a room in which the candidate is left to himself.

Social Inhibition.—The poorer quality of performance in a group shows that we have an opposed process to facilitation, namely social inhibition. Facilitation applies to the gross patterns of response of the individual. Inhibition is more likely to affect the subtle patterns involved in thought.

Social stimuli, like other stimuli, release energy in the nervous system in the form of nerve impulses. A gross pattern of response

like that of running, which involves many muscle fibers, is strengthened by the additional energy which derives from additional stimulation. A highly discriminating adjustment on the other hand involves the selection out of a few muscle fibers. This type of neuromuscular adjustment is easily disrupted by an increase in energy. The overexcitement in group situations thus tends to destroy sustained patterns of thought and other delicate adjustments such as skilled coordination. For example, very few people can think well on their feet when addressing a group. The golfer is easily disturbed on the green by a noisy gallery, and his putt may go astray. The basketball player can sink more goals in practice than in a game with a large audience watching him.

The additional stimulation which floods the nervous system in social situations comes only partly from the sight and sound of the people about one. A great deal of it is supplied by the functioning of the autonomic system which has been aroused by the original social stimulation. It often happens, therefore, that the individual who is emotionally insensitive will not be socially inhibited. People vary with respect to their susceptibility to social stimulation, but most individuals find their skilled coordinations and their thinking adversely affected by the group. Stage fright is an extreme instance of this phenomenon, and its cure lies in giving the individual a simple part with considerable action but with few lines. As he becomes habituated to appearing before an audience, he can be entrusted with more difficult roles and longer speeches.

Imitation.—Early writers on social psychology like Tarde and Ross were very much impressed by the eagerness with which people follow fashions in clothes, personal habits, and ideas.²² They explained group conformity and crowd contagion by postulating an instinct of imitation. Today we still accept the importance of imitation as a process of social interaction, but we question its instinctive basis. Imitation can be defined from an objective point of view as a close similarity between stimulus and response. Two forms of imitation can be distinguished: *Elementary imitation* and *complex imitation*.

(1) *Elementary Imitation.*—*Elementary imitation* refers to the setting off of a circular response by a stimulus similar to the response itself. For example, an infant a year old will respond to a laugh with a laugh or will repeat a stimulus-syllable, if that syllable is already part of its repertoire of babbling sounds. The mechanism at work is the conditioned response. The infant in its random articulation has stimulated its own ear with various sounds. The sound of a particular syllable thus becomes tied to the motor pathway for producing that very sound. Hence, upon hearing that sound, whether spoken by himself or someone else, the infant is conditioned to respond with a repetition of the syllable.

Elementary imitation really includes only those cases where the stimulation of another's speech or actions calls for no new responses. The person who imitates is neither socially nor individually original, for he is merely showing some previously acquired mode of response. We follow suite in the group by smiling, laughing, or yawning primarily because those reactions are part of an old repertoire which has been conditioned to the sight and sound of others similarly behaving.

(2) *Complex or Generalized Imitation.*—All imitation is not at as simple a level, however. Everyday observation reveals many cases of a generalized tendency to imitate which is more complex than the eliciting of actions previously acquired. We deliberately try to emulate the people we admire. During the freshman year the student sheds many of his high school values and habits and models himself after the campus leaders. Nor is the college world unique in its imitative tendencies. In all walks of life people aspire to be copies of the correct ways of thinking and acting as exemplified by a few leaders. But successful imitation of this description comes only after a period of trial-and-error learning.

Generalized imitation refers both to *mechanism* and to *motive*. The *mechanism* is to be found in the nature of human behavior. Behavior is a function of the stimulating world in the sense that it is directed specifically by the nature of the stimulus-pattern. To respond differentially to the objective features of the environment the organism must approach some point-to-point correlation between its actions and the details of the stimulating situation.

The child explores his world by following the contours and qualities of objects with his eyes and hands. A square means describing four motions at right angles to one another either with the hands or the eyes. Response thus implies motor re-creation or imitation. Later these detailed movements of imitating, or following, become so abridged that they are no longer good reproductions of the outside world. Nonetheless this internal mimicry is the basis of perception. It is explained by the principle of *adience* or the tendency of an organism to get more of the stimulus.²³ As the child explores a toy the movements he makes are further energized by stimuli arising from the process of exploration. The visual stimulation provided by the bright colors, the tactual stimulation from contact with the toy, and the proprioceptive stimulation from the movements of his arms all feed the activity in process, since the nerve impulses aroused are discharged over the most open pathways. And the most open motor pathways are those in use at the present moment, namely those which are responsible for the exploratory behavior. So the child continues to explore and in his exploring reproduces in his own movements the pattern of the objects examined. Similarly, in adult behavior when people seek to discover the exact nature of a situation, they recreate in their behavior its objective features.

To understand generalized imitation, however, it is necessary to know more than its mechanism. The mechanism tells us how the process goes on but it does not tell us why people tend to imitate certain actions rather than others. Hence a consideration of *motive* is indispensable to a thorough understanding of man's imitative behavior. The most general motive behind imitation is the wish to be like the person one imitates. By imitating some model the individual in his own eyes becomes the model.

For example, the child who plays soldier feels himself a military hero in the process. Likewise the stenographer who buys copies of Parisian frocks elevates her status to that of the society girl who wears the originals. Many devotees of swing music are proving their social alertness and sophistication in following this musical fad. Advertisers and propagandists have long understood the motivating force in back of imitation and have accordingly tried to present their wares as the accepted products of prestiged individuals. Once the

upper class takes up a custom its spread throughout society is generally guaranteed. Not so many years ago only women of doubtful reputation smoked in public. But after the practice was adopted by upper-class women it did not take it long to become widespread.

Other motives underlie imitation, although they are not as potent as the wish to enhance status or to take on the desirable attributes of the model. People follow leaders and ape one another because it is easier to imitate than to be original. Then, too, once an idea or action has the sanction of majority opinion, people accept it rather than take the chance of finding themselves in the out-group. In our culture there is also a premium placed upon imitation in the training of the child. At home the youngster who patterns himself after his elders is praised; at school the pupil who can echo the teacher's words or the lessons in the school book is rewarded.

Similarity in group behavior is not always the result of imitation. Human beings are sufficiently alike in their biological equipment and in their training so that they may all hit upon the same solution to the same problem. When grain is thrown to a group of hungry chickens they will all start pecking, not in imitation of one another, but because they are all hungry. In human behavior many instances of crowd contagion show a complex mixture of imitation and independence of motive. People bid at an auction, for example, partly because they are imitating one another and partly because they are moved by their cupidity to get their share of the bargains.

Suggestion.—The most important of all the mechanisms of social interaction, however, is suggestion. Suggestion is a process so difficult of measurement, yet so potent in its results, that its early psychological use was regarded as sheer magic. Mesmerism, a supposedly magical form of healing, was merely a special case of the working of suggestion. Suggestion is the uncritical acceptance of an idea or the uncritical following of an action. Suggestion is of two types: it is either direct or indirect.

(1) *Direct suggestion* refers to the acceptance of the stimulus-pattern because the individual's critical thought processes are temporarily inhibited. In subjective terms there is a narrowing of the

field of consciousness. In moments of excitement, for example, the person cannot think because emotional energy blocks out his sustained ideational patterns. Hence he is a prey to any passing suggestion. The same thing is true in moments of fatigue. The individual is too tired to think and so accepts someone else's idea.

(2) *Indirect suggestion* is likewise an uncritical acceptance, but it is uncritical because the thought processes are occupied with another problem. The constant repetition of advertising slogans is often effective because people unwittingly absorb them while they are attending to more important matters. The clever political speaker suggests ideas by implication, while ostensibly discussing an issue unrelated to the suggestion. An oversimplified example of indirect suggestion is furnished by the old question: Have you stopped beating your wife? Attention is centered upon whether or not the individual is still abusing his spouse with the implication suggested that he is a wife-beater. In indirect suggestion the technique is to direct the attention of the victim to an irrelevant problem and then to slip by his critical judgment the desired innuendo. The difference between direct and indirect suggestion is essentially a matter of whether the individual's ideational processes are inhibited or whether they are dissociated from his other behavior.

From our knowledge of the nature of suggestion it follows that any factor which makes for inhibition or for distraction of the thought process is conducive to suggestion. It is also true that the less intelligent the individual and the less experienced the person, the fewer sustained responses will be maintained toward the many objects and relationships in his environment. The unintelligent and the inexperienced individuals are suggestible because, in their case, there is less critical intelligence to inhibit or to distract. Experimental studies of children show that they are more suggestible than adults. Moreover, the curve of suggestibility gradually declines with age from the age of six to the age of sixteen.²⁴

The conditions which lead the individual to accept suggestion have been the subject of considerable investigation. Their importance is obvious, for a thorough acquaintance with these predisposing factors is becoming the stock in trade of the advertiser, the propa-

gandist, and the educator. Predisposing conditions can be described in fairly objective terms, but the actual operation of suggestion always is a relational matter between the objective situation and the individual. For example, the prestige of the source of the suggestion makes for blind acceptance, but what one individual regards as a prestiged source another individual holds in contempt. Three important factors which load a situation with suggestive possibilities are: (1) numbers and quantity, (2) the prestige of authority or of status, and (3) the mere fact of existence.—

Sheer size and sheer numbers not only compel respect, they also make most people very suggestible. Quantity as the most obvious aspect of things is often taken as a comparative measure of merit. Bigger becomes synonymous with *better*. The advertiser assures the public that his product is the best because it has the largest sale; the politician urges voters to get on the band wagon and not to throw away their votes on a minority candidate; some college presidents even use the yardstick of quantity or number of publications to measure the excellence of their scholars.

The deference to numbers and quantity is deeply rooted in the personality. As children we were unable to cope with objects and animate beings larger than ourselves. The approval of numbers in our immediate social group was equivalent to the satisfaction of our basic needs. Their approval meant security. Moreover, in our culture of large-scale production and a mechanized way of life, not only is size important but everything seems capable of being reduced to numbers. Small wonder that the child grows up sensitive to what everybody else is doing and saying.

Experiments have confirmed the importance of numbers in determining the beliefs of the individual. Moore asked students to indicate their preferences for various ethical concepts, for linguistic expressions, and for musical expressions.²⁵ Later the same type of judgment was obtained, but this time the students were told the majority verdicts on these matters. Many of the students who had been in the minority reversed their opinions to accord with the majority. The suggestive effect of majority opinion was greatest in the field of ethical judgment.

An interesting study of the individual's psychogalvanic response when he knows he is expressing a minority opinion has been made by Smith.²⁶ The psychogalvanic skin response can be obtained by placing electrodes on the fingers and measuring the resistance of the skin to electric current. This measure is an index of emotion. Before recording the psychogalvanic response the subjects had been asked to indicate their agreement or disagreement with a number of statements. Four weeks later they were brought into the laboratory and again asked to indicate agreement or disagreement. This time their psychogalvanic responses were recorded. The psychogalvanic responses were considerably greater when the subjects differed with group opinion than when they agreed with group opinion. To go against the group produced conflict and emotional tension.

The belief that one's fellows are acting or thinking in the same manner has been termed by Allport *the impression of universality*.²⁷ This impression of universality rather than the real degree of agreement with the group is the important factor in suggestion. In political psychology much has been made of the *band-wagon effect*,—namely the tendency of people to follow the majority. Yet in the 1936 election the *Literary Digest* poll which announced a decisive majority for the Republican candidate was widely publicized and dramatically broadcast over the air. Similarly in the 1948 election the polls and the press were contradicted by the voters on election day.

Some observers have interpreted this event as decisive proof that there is no band-wagon effect and that people are not susceptible to the suggestion of majority opinion. This interpretation overlooks the subjective character of the impression of universality. The important consideration for the individual is not the total universe but the universe with which he identifies himself. In national elections the voter is concerned not with sheer numbers but with the way in which his group is voting. The people outside the group or groups which he considers important *do not count*. The effect of numbers as such has to be qualified to include the numbers which the individual is willing to count. The middle classes do not care to model themselves after the lower classes even though the lower classes may outnumber them.

To qualify the effect of numbers by a consideration of the class-membership character of those numbers is to introduce another factor as a determinant of the suggestion process—namely, the factor of the prestige of authority or of social position. In the minds of many individuals there is no conflict between what is commonly done and what the best people do. Those who do not follow the example of the best people are not included in the psychological universe of the individual. Thus one believes he is on the side of the best minds and that the majority of right-minded people are with him. It is the exception rather than the rule to find a person who deliberately opposes in his mind the opinion of the expert and the opinion of the majority.

In a sense it is circular to speak of the prestige of the source of suggestion. A position, an individual, or a symbol has prestige only for those who accept their suggestions. In the final analysis prestige is less a matter of the objective nature of the stimulus-pattern and more a matter of attitudes of deference. In other words prestige is another term for the phenomenon of suggestion. Its use is justified, nonetheless, by the fact that it enables us to relate suggestion to many already familiar facts of social life. For example, we know that for most people prestige attaches to positions of authority in large organizations, to specialists or experts in a given field of endeavor, to upper class membership, and to certain values in a particular culture.

Just why people should accept without critical evaluation the ideas of prestiged persons is a complex problem. One reason is the individual's inadequacy to cope with more than a very limited area of life. He lacks the knowledge and the training to oppose the views of experts. The prestiged person, moreover, has achieved some success denied to the average man. The average man is not analytical about this success and assumes that if Thomas Edison was great enough to give the world practical inventions, he was also great enough to give the world sound political advice. Again we find the mechanism of the conditioned response at work. The deference to Thomas Edison as an inventor is carried over to everything that Thomas Edison says or does. Then, too, the prestige of authority is related to childhood acceptance of the authority of parents and

elders. The individual learns through experience to bow to superior force, and this becomes an unquestioning obedience to symbols of authority. Distinctive symbols have been set aside to represent the authority of the state, such as the uniform of the police, the robes of judges, the seal for official documents, and the titles of officials.

Numerous studies have demonstrated the prestige value of the names of experts in inducing acceptance of ideas. The testimonial of the advertisement is supposed to be effective only for the unsophisticated, yet college students will judge literary passages, musical compositions, paintings, and political utterances according to the names attached to them. For example, a passage accredited to Edgar Guest (but really written by Shakespeare) will be regarded as very poor, whereas the same passage attributed to Browning is judged as an excellent bit of writing.²⁸ Similarly, political ideas presented as the statements of Karl Marx are rejected as false, but if presented as the statements of Calvin Coolidge they are accepted as true.

Reference has already been made to the way in which success in one field is sufficient evidence for people to accept the successful individual as an authority in all fields. In an experimental verification of this fact Bowden, Caldwell, and West asked students to rate the following seven men on the basis of their authoritative command of fifteen fields of knowledge: Herbert Hoover, Charles Lindbergh, Albert Einstein, John Pershing, Thomas Edison, Theodore Roosevelt, and John P. Morgan.²⁹ All of these men were ranked as authorities in most of the fields of knowledge listed. Thus Pershing was regarded as an outstanding authority not only in military affairs, but also in mathematics, engineering, and government. Theodore Roosevelt was considered an outstanding authority in government, military affairs, economics, education, and law. In general, military prestige seems to overshadow other forms of prestige, for Pershing was only slightly below Einstein as a mathematician and decidedly above Hoover in this respect.

The third predisposing factor in the suggestion process is the readiness to accept the established fact. One of the techniques of politics is to confront people with the *fait accompli*. Whatever is, tends to be accepted as right and proper by virtue of the fact that

it exists. The basis of this acceptance of the status quo stems from a wholesome acceptance of reality. As children we learn we cannot wish away facts.

The acceptance of the accomplished fact, however, ceases to be the same type of wholesome adjustment in the social world that it is in the natural world. We cannot change the climate, although we can protect ourselves from it. In the social world, on the other hand, the social realities are often amenable to change because we ourselves are the social realities. Thus if a dictator were to seize office in this country, we would be confronted by an accomplished fact. If our critical processes of thought were not overwhelmed by this fact, we might find that he could be overthrown without too much difficulty if most of us did not want him. In other words, the accomplished fact in the social world remains the accomplished fact largely because people accept it. It is like the circular argument of the prohibitionists in the days of the Volstead Act. They maintained that prohibition would work if people only observed the law. But people did not accept the accomplished fact that a prohibition law was on the statute books. This law failed to be accepted as a suggestion, because it ran counter to too many fundamental wishes of the American people.

In general, however, people will bow before the statement that a certain condition exists as a fact and not a theory. The mere existence of a state of affairs is taken as presumptive evidence of its necessity and even of its righteousness. Katz and Cantril asked students about their attitudes toward Communism and Fascism.³⁰ Although the overwhelming majority were opposed to both Fascism and Communism, a majority thought that Fascism was a good thing for Italy and Germany and that Communism was a good thing for Russia. Whatever system prevailed in a given country was regarded as the desirable state for that country, no matter how contradictory the systems were.

In addition to the predisposing conditions just described it should be added that suggestibility is a function of the individual personality. People differ with respect to their readiness to accept suggestions in general. On the whole the well-integrated personality is less sug-

gestible than the poorly integrated personality. The person, whose personality comprises many unrelated segments cannot bring to bear upon a problem the many experiences which might aid in its solution. He is dissociated and meets the situation with only part of himself. The well-integrated individual, however, has a unified point of view which is the result of the fusion of many experiences. Hence he can meet a situation and examine all of its implications. Thus he can resist suggestion more effectively than the poorly integrated person.

Unfortunately our complex culture makes integration a difficult process. The child grows up in an institutionalized world with the school, the home, the play group, the Boy Scouts, and the Sunday School making demands upon his time and allegiance. Often these demands are unrelated and even conflicting. No central coordinating thread runs through the many activities in which the child finds himself. Hence many youngsters grow up with no unified interests in life. Even when they enter college they do not know what vocation they want to follow. As adults they have no central philosophy of life and blindly accept the "easy solutions" suggested by the propagandist.

The Limits of Prestige Suggestion.—The description of suggestion as the uncritical acceptance of ideas and the traditional experiments demonstrating the blind acceptance of incorrect beliefs give, however, too much of an all-or-none description of the human mind. The inference is either that people act intelligently and critically or else they act stupidly in automaton fashion under the influence of suggestion. The Gestalt psychologists have rebelled against this extreme formulation and have tried to show that the responses of human beings are rational and meaningful if the situations are structured with any possibility of a meaningful solution. H. B. Lewis has experimentally demonstrated that people will not accept prestige suggestions if these suggestions do not make sense in terms of their frames of reference.³¹ For example, ardent supporters of New Deal philosophy would not accept ideas linked to the name of Franklin D. Roosevelt when these ideas ran counter to their structure of beliefs. The conflict between the older studies of suggestion and the more recent work of the Gestalt school can be resolved along these lines:

Suggestion serves to limit the assumptions and to narrow the frame within which the individual operates. Within that limited framework, things must make sense. Thus a person behaves logically even while accepting suggestions in that he does relate the suggestion in a meaningful way to a pattern of beliefs. But he does not act in the most rational manner in that he limits his meaningful search for relationships to a very restricted interpretation of the universe.

Identification.—Human beings prefer a group way of life to a hermit-like individualism because they are neither economically nor psychologically self-sufficient. The mechanism that compensates for their psychological insufficiency is known as *identification*. Through identification the individual enters into the lives of his fellows and thus enjoys a fuller and richer experience than his own activities would permit him. Identification enables him to be an active member of the group, for his ego becomes involved in its symbols. Identification also makes possible the vicarious enjoyment of adventure and of a life of glamour offered by the movies, the radio, and literature.

Identification may be defined as the process in which the individual extends the boundaries of his ego to include more than his physical self. People, objects, and symbols are psychologically regarded as part of one's self. Freud has described identification as the earliest expression of an emotional tie with another person.³² The little boy takes his father as his ideal and patterns his behavior after that of his father. Early identification also extends to favorite toys. The child will be so attached to a toy that he will carry it about with him and take it to bed at night. The cherished toy is almost part of his personality.

Patterns of similarity between the person who does the identifying and the people or things he identifies himself with facilitate the process. The girl finds it easier to identify herself with other girls than with boys. Horowitz has shown that white children identify themselves more with other white children than with Negro children, and similarly Negro children identify themselves more frequently with other Negro children than with white children.³³ In fact the Negro children showed less tendency to identify themselves with

white children than the white children did to identify themselves with Negro children. Probably social influences had taught the Negro children to be conscious of themselves as a distinctive group.

The leader or official of the group often has the function of being the symbol with which the followers can identify themselves. Impersonal symbols like flags or slogans are not as effective devices for securing group identification as a human being. The personality of an individual can sum up the aspirations and characteristics of the group. Hitler's hold upon the German people was due in part to their ability to identify themselves with him. They suffered crushing defeat in World War I; Hitler was a corporal in the defeated army. They suffered from a ruinous inflation; Hitler was one of the underprivileged masses. They longed for the time when Germany would avenge the ignominious peace terms of 1918; Hitler voiced their wishes and embarked upon a policy of rebuilding the empire. They wanted employment and security; Hitler expressed this wish in aggressive and decisive terms.

The advantages of a human symbol in intensifying the process of identification explains why a political democracy like England has kept its king. Hitler was both an active leader and a symbol, but the King of England is pure symbol. Englishmen all over the world find in their king a symbol of the unity of the British empire. They feel their membership as Englishmen in this empire all the more keenly because they can identify themselves with the typical English character which the king represents. Our presidents do not serve quite this function because, as active participants in political affairs, they are too much like ordinary men. Their partisans identify themselves with these leaders, but the members of the opposition party will have none of them.

The mechanisms of facilitation, inhibition, imitation, suggestion, and identification are the explanations of why people behave differently when together than when isolated. All these mechanisms make for similarity of conduct and belief. Group living can be carried on only under conditions of uniformity and orderliness in human behavior. Human groupings are the stratified results of the dynamic processes of interaction. These processes socialize the egoistic and atypical wishes of the individual.

THE METHODS OF SOCIAL PSYCHOLOGY

Most of us are more interested in answers than in the process by which answers are derived. Like the layman we accept the findings of scientific investigation in the same manner in which we receive any suggestion from a source of great prestige. Unlike the layman, however, it is possible for us to acquire some appreciation of the relevant methodology in the various provinces of psychology. On the basis of this knowledge we can form our own opinion about the answers of the specialists. In our present exploration into the field of social psychology we have gone far enough to have some idea of the nature of the discipline. Before we attempt a more thorough penetration into its answers we need to know the processes by which these answers have been formulated. Three main methods can be distinguished: The laboratory approach, the survey method, and action research.

The Laboratory Approach.—The laboratory approach is the basic method of all psychology. As such it is already familiar to the student and needs no detailed exposition here save as it raises particular problems for social psychology. The great advantages of the experiment carried out within the laboratory are the control, isolation, and measurement of the many factors related to the process under investigation. Everyday observation may tell us that there is an increase in activity in the group situation as compared with solitary performance. The significant factors associated with this increased activity can be isolated in the laboratory and their relative importance determined.

Experiments with Human Subjects.—For example, is the increased performance in the group due to the mere presence of others, to the fact that they are working at the same tasks, to the emotional rivalry engendered by a competitive situation, or the mere knowledge that others are working on the same problems? In an attempt to measure the importance of all these factors, Dashiell has carried out experiments (1) in which the performance of people working alone with knowledge of fellow workers in other rooms was com-

pared with performance of individuals working alone without knowledge of co-workers, (2) in which the performance in presence of spectators was compared with the performance in presence of co-workers, (3) in which the performance of individuals in a group motivated to compete was compared with performance of individuals working alone but also motivated to outstrip their fellows, and (4) in which an attempt was made to remove conditions of competition and rivalry for both group and solitary performance.³⁴ By this type of controlled experimentation it can be demonstrated that competition is the most effective factor in increasing group performance, but that the mere presence of fellow workers also increases the amount of work done.

Laboratory experimentation in social psychology has obvious limitations. Human beings are poor guinea pigs. We cannot keep them in the laboratory and control their experience and their motives as we can animals. For example, even in Dashiell's careful study the effect of rivalry could not be completely eliminated in individuals who were not encouraged to compete. Their many previous habits of competition in group situations may have affected their performance. To overcome this directly, it would be necessary to rear a number of human beings under laboratory supervision. Unfortunately the limitation of the uncontrollability of the experience and motives of the human subject is greatest in relation to some of the most significant problems in social psychology. Crowd behavior, strikes, social movements, wars, elections, nationalism, and institutional change, to cite only a few instances, cannot be brought into the laboratory.

Experiments with Animal Subjects.—To overcome the uncontrollability of human subjects, animals have sometimes been used in social experimentation. Our experimenter established a taboo in a group of monkeys in the following manner.³⁵ A banana was suspended from a pole out of reach of a group of monkeys in a cage. When one of the monkeys climbed the pole and grabbed the banana, hot water was released into the floor of the cage to the discomfort of all the monkeys save the one who was on the pole eating the prize he had secured. It did not take the group long to learn

the cause of the flooding of the cage and soon any enterprising monkey who started after the banana was punished. The coveted fruit was admired from a distance and became taboo for all the monkeys in the cage. This situation illustrates the nature of many of our social taboos and shows how even complex situations can be set up experimentally and studied.

Animal experimentation on social problems has an advantage which is for other purposes a disadvantage. Animals lack the many social traditions which color and determine human behavior. Hence by studying the social psychology of animals we can discover what is fundamental to processes of social interaction and what is due to the particular cultural complex of the group. On the other hand, these cultural or traditional factors are frequently of great importance in a study of social problems. Hence animal experimentation can shed little light on many of the social processes about which we are most concerned.

In general, we may conclude that laboratory experiment is the most valid method but that it is not adequate for the study of all social phenomena. It is valid in the accuracy of its findings, but its answers are limited to a narrow range of situations. The mistake is sometimes made of overgeneralizing from a simple laboratory experiment to a complex life situation. Experimental findings are valid, of course, only for the type of process which is controlled within the laboratory setting. On the other hand, the student should realize that the laboratory method is in its infancy with respect to social experimentation. Though there are limits to its use, we are very far from reaching those limits. Moreover, some problems which seem at first glance to lie outside the laboratory can be neatly fitted into controlled experiments by the ingenious investigator.

The Survey Method.—Surveys conducted outside the laboratory through interviews with people and observations of their behavior have developed into a very promising methodology for both social psychology and the social sciences. Surveys are not new but the systematic gathering of data, the use of depth interview, the growth of precision sampling and the application of research design have transformed the public-opinion polling of the commercial agen-

cies into a valuable tool for scientific purposes. The main advance is the use of research design, which calls for the identification and measurement of the important variables in a problem so that relationships between them can be established.

For example, social psychologists were called upon during the war to evaluate the effect of strategic bombing on German civilian morale.³⁶ Measures were obtained of exposure to bombing as the independent variable by studies of the air force records and by recording of the destruction of homes in given German cities. German towns thus could be put on a scale from unbombed to very heavily bombed. The dependent variable was German morale or motivation toward the war effort. This was measured by getting indices of behavioral morale from production and absenteeism records and by indices of psychological morale from interviews with German civilians immediately after the war. Intervening variables included such factors as degree of Nazi identification, adequacy of air-raid shelters, adequacy of postraaid relief, and the effect of other military events. In other words, the effects of bombing upon morale were assumed to be mediated through these intervening variables. The results showed that bombing produced defeatism and apathy among the German people. The maximum effects came with relatively light bombing. Although morale was depressed by the bombing, the effects did not produce greater resistance to the Nazi regime. The German people still obeyed the orders of the police state, but they had lost heart for the struggle.

Action Research.—The survey method is handicapped by measuring factors as they occur in real life, for the laboratory factors can be experimentally manipulated at will. In time it might be possible to measure important combinations of factors in their mutual interaction by the survey method. But this would be an extremely costly way of proceeding. A short-cut is available in many problems through the use of action research. This method means putting into effect a program of action and measuring its outcome. An illustration would be a program of re-education in a community to improve race relations or the restructuring and reorganization of a factory to improve production and morale. Action research is limi-

ited by the cooperation which non-scientists are willing to give to the introduction of changes. It is also limited in that the proposed changes must generally be in the direction of social betterment to justify their being tried. Often in science we need to vary a factor in either direction to be sure of the effect we get. Nevertheless, this method combined with the survey procedure opens up more possibilities for research in the social field.

Contributions of Field Theory.—Research in social psychology has too often been statistical in its orientation in overemphasizing the easily-counted characteristics in a problem and neglecting the significant variables. This tendency has been corrected by topology and field theory. Instead of counting noses and classifying frequency of responses according to definite categories, topology or field theory regards the relationships existing within the field studied as a function of the total field. This is essentially an application of Gestalt psychology to social psychology.

The statistical approach would give us a picture of a nation at war in terms of the number of combatants on the front line, the number of casualties, the number of aliens arrested, the number of subscriptions to war loans, the number of dollars being made by war profiteers, etc. Field theory would see everything which happened as a function of relationships within the total field. It would point to the demolition of barriers between classes, to the breakdown of barriers between the sexes as groups with distinctive economic roles, in short to the weakening of all local divisions in the interests of national unity against a common enemy. The nation is at war and everything else is to be viewed as a function of this organization of the social field. Having ascertained the nature of the total situation the field theorist can predict without counting that huge profits will be made due to the increased demand and the limited supply of commodities. He can predict without statistics that more women will be found in industry, that officers from upper class families will marry nurses from lower class families. The nation is at war and this fundamental relation is the determining factor.³⁷

Another way of saying this is to point out that field theory is bitterly opposed to *local determination*. Local determination means

that units in the social field are determined by their nature as units and by the influence of surrounding units. Field theory affirms that these units to the extent that they exist are determined by the total relations obtaining at the moment in the whole situation. The lynching of an alien, for example, during a war is not determined by the sadistic nature of a few bullies who happen to be in the crowd. The lynching is a function of the total war situation in which people's emotions are aroused and find expression against almost any alien object.

Field theory thus is a wholesome influence in correcting the tendency to neglect the woods for the trees. Too often, conclusions are drawn on the basis of a detailed statistical analysis which miss important determinants in the total situation. Like other cross-sectional approaches, however, field theory is weak in portraying basic motives or in formulating predictions for future events. The field theorist is committed to the doctrine that explanation is to be found only in the present situation. Motives, he contends, are not past forms of energy but are dynamic processes effective only if they are contemporaneous. Logically this answer is correct but we are limited, indeed, if we must investigate each situation anew to know anything about it. It is only when we can relate the present to the past that we can make realistic predictions. Men's actions tomorrow are the logical extension of their behavior yesterday. Even a new total relationship such as the nation at war does not affect everyone alike.

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CHAPTER VII

THE PSYCHOLOGY OF THE CROWD

By DANIEL KATZ, *University of Michigan*

The psychology of the crowd is the best chapter in descriptive social psychology. There have been three classical contributions to this chapter. In 1892 Gustave Le Bon set forth the problem in brilliant fashion.¹ He described the emotional nature of the crowd man and suggested the importance of unconscious motivation. His account was biased, however, by his conservatism and weakened by his lack of analytic tools. Everett Dean Martin in his 1924 account of crowd behavior improved the description by applying the concepts of Freudian psychology to the crowd man.² In 1924 Floyd H. Allport contributed the best analysis of the mechanisms of crowd behavior.³ Both Martin and Allport succeeded in reducing the problem of crowd psychology to the problem of individual behavior under special types of motivation.

Impressed by the common characteristics of crowd behavior—such as suggestibility, intolerance, and emotion—these authors tend to make all crowds essentially alike. They have ignored the differences between revolutionary crowds, student riots, panics, frontier lynchings, and exuberant celebrations such as occurred the world over on V-E Day. Before examining the limitations of the older notion of putting all crowd behavior into a single category, we need to look more carefully into the theories and observations of Le Bon, Martin, and F. H. Allport.

Le Bon's Account.—The crowd, as Le Bon defined it, was not merely a collection of people but one with the assumption among them of a special mental condition. Crowd behavior exhibits new characteristics very different from the actions of the individuals composing it when they are in isolation. The conscious personality

of the individual disappears. He no longer thinks of himself as John Jones or Bill Smith. "The sentiments and ideas of all the persons in the gathering take one and the same direction." A collective mind is formed. This collective mind is made up of the unconscious desires common to the race. The individual aptitudes and unique personal characteristics of people are temporarily in abeyance as the common unconscious substratum takes possession. This is why the crowd is so inferior intellectually and can never accomplish acts requiring a high degree of intelligence.

The individual who ordinarily keeps his unconscious wishes or instincts under restraint will in a crowd situation be so affected by a sense of power deriving from the numbers about him that he will surrender to his unconscious. His sense of responsibility disappears. This yielding to primitive urges is also aided by the suggestibility operating in the crowd and by the contagion of the example of others. The individual in the crowd acts like a hypnotized subject. The release of the unconscious wishes accounts for the ferocity, the enthusiasm, and the violence of the cultivated individual in the crowd situation.

The resulting characteristics of the crowd man are: (1) Extreme credulity which makes possible the creation and circulation of legends; (2) an exaggerated and absolutistic type of thinking which eschews distinctions and sees things in terms of black and white; (3) an intolerance which will brook no contradiction nor discussion; (4) an authoritarian, ambivalent character with either blind subservience to force or ruthless domination of the weak; (5) a lack of morality in the sense of permanent repression of selfish impulses, but an exaggerated morality on occasion in terms of great devotion and sacrifice.

Le Bon generalized his conception of the crowd mind to include more than the face-to-face group. People, not in one another's presence, affected by suggestibility and contagion, exhibiting the same characteristics as the face-to-face crowds, were possessed by the same special mental condition.

The description of Le Bon suffers from its literary formulation which makes much of the collective mind. Although this was an effective figure of speech, it was an inaccurate way of describing the

crowd situation. For later popular writers it shifted the emphasis away from the crowd members to some mysterious force.

In keeping with the belief of his day, Le Bon identified the unconscious wishes of the crowd members with the common racial inheritance of the group. There is no evidence to establish the notion of a racial unconscious—or archetypes, to use Jung's language. But Le Bon showed excellent observations in his description of the emotional aspects of crowd behavior and keen insight in his point that the crowd furnished the means for the release of repressed, unconscious wishes.

Martin's Theory of Crowd Behavior.—In developing his theory Martin leaned heavily upon Le Bon's basic thesis that the crowd was a special situation for the release of unconscious wishes. Utilizing advances in Freudian psychology Martin worked out the specifics of the functioning of this one type of crowd motivation. Like Le Bon, Martin defined the crowd as a certain mental condition which may affect a group, but unlike Le Bon he did not regard this condition as a collective mind. The emphasis instead is upon the release of common repressions "because certain controlling ideas have ceased to function in the immediate social environment." Such controlling ideas would be, for example, the belief in the sanctity of human life, the belief that personal aggression of a physical sort is the act of a ruffian, the notion that it is wrong to destroy property, etc. The study of crowd behavior is then directed toward two problems: (1) How does it happen that the socialized wishes can be temporarily inhibited; and (2) what is the nature of crowd behavior once the crowd has been formed?

The theory, that the crowd represents a modification of the social environment in which the primitive desires can now pass the censor or super-ego, has still to explain the origin or formation of the crowd. Granted that unconscious feelings can gain expression when repressive social norms are relaxed, how does this relaxation of the controlling ideas take place? Social norms do not exist in the abstract; they are the prevailing attitudes of the people in the group. How does each individual come to know that those about him

are not going to frown upon behavior ordinarily regarded as anti-social?

Martin's description of crowd formation is that "the modification in the immediate social environment is the result of mutual concessions on the part of persons whose unconscious impulses to do a forbidden thing are similarly disguised as sentiments which meet with moral approval." This is brought about by the crowd leader who directs the attention of crowd members to abstract and general moralizations. These emotional generalities are disguises which are really symbols of unrecognized meanings. They function as a closed system like the logic of the paranoiac to permit people to act under the guidance of their repressions.

The assumption is that a basic conflict exists between the usual socially-accepted behavior and the more primitive egotistic wishes of the individual. This conflict makes for psychosis when the individual seeks a solitary path in its solution. "Another path lies open," writes Martin, "—that of occasional compromise in our mutual demands on one another." And it is the crowd situation which provides this path through the unconscious change in the significance of social norms.

The nature of crowd behavior is therefore analogous to, but not identical with, the behavior of the psychotic. Individual crowd members are not disregarding the real world as does the insane person, since they are adjusting to one another in accomplishing their purposes. Nonetheless, the crowd-member indulges his egoism in a meglomaniac manner by merely shifting self-praise to idolatry of his crowd. In a religious revival the gambler, the drunkard, the loafer, the weak and unsuccessful become the privileged, the important, the redeemed, the recipients of divine love. In many crowds the leaders are heroes and saviors whose mystical powers are unconsciously shared by crowd members.

The delusion of grandeur in the crowd has its complementary part in delusions of persecution which make the crowd a creature of hate. It magnifies the injustice its members have suffered and finds an object toward which its hatred can be released. The southern lynching mob kills its harmless victim with the excuse that he constituted a threat to white supremacy. Frequently, groups that start

out as mild crowds develop into homicidal mobs. Riots at athletic contests that seem to start as an overflow of enthusiasm sometimes end in violence and destruction. The explanation that Martin gives is the reservoir of hostility and sadism, long repressed, which finds release as people in the crowd situation sense the mutual relaxing of social controls.

As in Le Bon's account Martin finds the crowd to be dogmatic and absolutistic in its thinking. Fixed ideal systems take the place of discriminating intelligence. To the crowds there are no problems calling for thoughtful solution. Rather there are absolute truths, closed systems of idealistic abstractions, allegiance to cult ideas.

In spite of the great similarity between Le Bon and Martin in their characterization of crowd behavior, Martin has succeeded in shifting the emphasis from the crowd mind as a function of the racial unconscious to the psychology of the individual torn by the conflict between socialized prohibitions and egoistic wishes. It would follow from Martin's thesis that the greater the repression and regimentation of people during the socialization process the greater the possibilities of crowd behavior in later life. The limitations in Martin's analysis are twofold. He concentrates upon the unconscious motivation of the crowd man, and he fails to describe adequately the conditions under which crowd behavior will occur. In his account of crowd formation with the mutual surrender of social norms through attention to general and abstract principles, it is never quite clear as to how people, unaware of their own motives, can subconsciously sense a similar desire in others,—so that they mutually and simultaneously relax the super-ego side of their personalities.

The Analysis of F. H. Allport.—In describing the crowd Martin took advantage of developments in abnormal psychology since Le Bon's time, but he confined himself rather narrowly to a Freudian psychology. F. H. Allport contributed a much broader interpretation by drawing upon social as well as abnormal psychology. His account can be summarized under six main headings.

(1) *Crowds are struggle groups of an elementary or violent sort whose fundamental drives have been thwarted or menaced.* The free

expression of the need and wishes of the crowd members have been blocked or threatened, and collective action is taken to restore these drives to their normal operation. Allport assumes as did McDougall that restraint or thwarting of the individual is the adequate stimulus for struggle. The more recent formulation of this principle is known as the frustration-aggression hypothesis. In general, however, this hypothesis assumes aggression against some scapegoat when people are frustrated. Allport's theory does not limit the role of aggression to scapegoating but tends to emphasize the realistic nature of the collective struggle response. Thus the crowd, taking action against a sex maniac, may be defying the law, but its members are reacting against a real menace to their families. In Martin's description it was dominantly the unconscious repressions that were released in crowd behavior, but in Allport's presentation the driving forces can be either conscious motives or unconscious desires.

(2) *Crowd behavior is essentially an exaggeration of individual behavior.* "The individual in the crowd behaves just as he would behave alone, only more so." The individual is not seized by a crowd mind which mysteriously transforms him from a Mr. Milque-toast into a sadist brute. Rather the fundamental drives and behavior of the individual become intensified in the crowd situation. The crowds storming the Bastille during the French Revolution contained oppressed people whose friends and relatives were imprisoned there. They were now doing overtly what they had always wanted to do.

(3) *Social facilitation is an important mechanism in crowd behavior.* The experienced crowd leader knows the importance of expressive behavior. He appeals to emotions and produces common overt responses by having the group applaud, stand up together, sing together, etc. He groups them so that they are physically close to one another. Thus the individual in the presence of many others, doing the same things he is doing, is stimulated to intensify his responses. This social facilitation becomes circular, for the more vigorous one person is in his applause or his laughter the more he stimulates those about him and the more they in turn stimulate him. This principle is well illustrated in the studio audience, utilized

in all large broadcasts, and it is one reason why the radio needs a studio audience.

(4) *The physical presence of others responding in unison creates an impression of universality.* As people about us in an audience vigorously applaud an idea, it seems as if the views expressed were the views of everyone. The real universe of millions of people who should be taken into account on the problem are not as important as the few hundred whom we see and hear all about us in the crowd.

(5) *The crowd is a large-scale suggestion phenomenon.* The stimulation which we receive in the presence of many of our fellows tends to increase overt activity but to inhibit the implicit thought reactions. The blocking out of critical thought is the condition par excellence for suggestion. Motivated by basic drives which have been frustrated, the individual will now accept any course of action which seems to promise a remedy.

(6) *Social projection operates in the crowd situation, especially in the initial stages.* We not only conform to the suggestions of the crowd leader and to the expressive behavior of those about us, but we also project our own ideas and feelings into other people. We interpret their general responsiveness as an endorsement of what we ourselves want to do. This is very important in the formation of the crowd and helps to account for the mutual relaxing of social norms to enable deep-lying wishes to emerge.

(7) *The crowd affords an unusual opportunity for the resolution of individual conflicts.* The socialized drives exert a restraining influence upon our egoistic wishes and primitive desires as Martin pointed out. The immediate reinforcement of these socialized wishes comes from the presence of other people. As children we learn to inhibit our predatory and aggressive reactions through punishment and disapproval of other people. The knowledge that others are watching us, or will find out what we have just done, is an important restraint upon us. But in the crowd situation the presence of other people now takes on a completely different meaning. Instead of acting as

a check upon our egoistic desires the presence of other people in the crowd serves to release and facilitate these wishes. It is as if the child who was always punished by his mother, when he attacked another child, now finds his mother approving his aggression. This temporary resolution of conflicting forces within the individual arrays both sets of forces on one side and accounts for the terrific motivation of the crowd. It is now socially acceptable to do the things we have previously wanted to do, if it were not for the inhibiting effect of public opinion. The Nazis used this motivation cleverly to make heroes of people for indulging their brutality and sadism.

This principle of crowd behavior is the most central concept for explaining its distinctive character. It was suggested by Martin, but its more precise formulation is the work of F. H. Allport. It runs somewhat counter to Allport's principle of the exaggeration of individuals behavior in the crowd. The latter principle accounts only for the quantitative intensification of behavior; and does not permit of qualitative changes. The resolution of conflict, however, implies the qualitative transformation of response.

This apparent inconsistency in the Allportian theory is due to the tendency already suggested of treating all crowds and all forms of motivation within the crowd as if they were the same.

THREE TYPES OF CROWDS

Although many of the same mechanisms may be found in all crowds, they operate to produce different end results depending upon the motivational basis and the total social situation. Insufficient attention has been given to the various crowd patterns. At least three types of crowds can be distinguished—the community crowd, the fanatic public, and the class crowd.

The Community Crowd.—In early American history and to-day in undeveloped rural sections of the country we find the *Community crowd* which takes the direction of *lynch law*. Cattle rustlers, horse thieves, bank robbers, and claim jumpers have all been subjected to the justice of crowd rule. Thus gamblers, drunkards, and

other individuals of loose morals have been treated to tar and feathers or ridden out of town upon a rail. In these cases we see the community joined to enforce an ethic which they feel together, rather than to overthrow such an ethic. The community crowd functions to protect existing social norms.

The Fanatic Public.—The *fanatic public*, which appears in the more developed state of an economy, is different from the lynching crowd. Most individuals in the fanatic public are seeking some sort of self-expression which may be quite independent of any community feeling. The Frank Sinatra public showed all the signs of crowd behavior, but the emotion was in no sense directed toward elements which jeopardize community life.

The Class Crowd.—The *class crowd*, on the other hand, is a struggle group, which is not inclined toward protection of community ethics. Its members are bent upon discovering rationalizations and other incentives by which they may abandon traditional institutional attitudes for more fundamental beliefs which have long been repressed. The class crowd is on the objective side a threat to the state, and to principles of law and order which benefit other groups.

Crowd Mechanisms.—Yet the same crowd mechanisms operate to produce these three different results. This fact most authors have failed to see. As a consequence, the French Revolution which is an affair of classes, and includes the overthrowing of the feudal state, is treated as if it were identical with a religious revival or with frontier mob rule. Each type of crowd involves, however, different elements. The problem of the community crowd is the problem of individuals with a set pattern of behavior of a very fundamental sort which is jeopardized by the behavior of other people. The sex crime seems a threat to every law-abiding citizen in his own pattern of life. The cattle rustler who steals some other person's cattle may eventually turn toward your own.

The problem of the fanatic public, however, is one of finding new and common modes of expression for all sorts of repressed wishes. The new modes of expression serve as a safety valve for

the release of repressions. In obtaining this release the members of the fanatic public are not waging a war either against the community or against the enemies of the community. They are merely seeking relief from the many institutional attitudes of their culture. They do not want to discard these attitudes completely, but they want to forget for a moment that such values exist. Hence fanatic crowds are silly, exuberant, intoxicated, enthusiastic, and vain, but not revolutionary.

The class crowd creates situations which are revolutionary in their implications. The phenomena which appear in the class crowd like the phenomena of the fanatic crowd are based upon thwarted wishes. The chief repressive agent in the case of the fanatic public is the institutional pattern of behavior located in the members of the fanatic public themselves. On the other hand, the chief repressive agent in the case of the class crowd is the organized police power of the state. In the *fanatic public* the individuals are rebelling against themselves; in the *class crowd* the individuals are rebelling against their external enemies.

THE FORMATION OF A CROWD

Because the fanatic public is slower in formation than a community crowd or a class crowd, it affords a better opportunity for the study of early crowd mechanisms. Community crowds are generally precipitated by some striking event such as the kidnapping and maltreatment of a child. The impact of the exciting condition produces sudden and drastic changes in the individuals who become the crowd, and the psychological development of the crowd process is difficult to trace. The formation of a fanatic public can be observed, however, in which a great orator can start with individuals in their everyday attitudes and by the end of his speech have his auditors whipped up to a frenzy of crowd emotion. This audience situation provides an opportunity to observe each stage of crowd development in detail.

Polarization.—Crowd action is predicated upon the ability to secure what Woolbert has called a *polarized audience*.⁴ *Polarization*

represents a condition in which the audience members are under the complete control of the speaker's words and gestures, in which attention is riveted upon the speaker. In the case of mobs and class crowds, polarization is a fairly easy task for any speaker who represents the cause of the crowd members, because the community and class crowds are selected groups. They comprise only those individuals who are fundamentally prepared in advance for unusual action. In the development of an audience into a fanatic public, however, the speaker must secure polarization by the careful use of the following techniques.

(1) *The speaker attempts to remove all counterattractions.* It is obvious that all stimuli are not completely under a speaker's control, but many of them are. He cannot prevent individuals from eating too heavy dinners, but he can control the heat, light, and comfort within the auditorium. He can see to it that nothing about his own appearance (watch charms which twinkle, gestures which distract, nervous walking which annoys) leads away from his message. He can ask other people to stay off the platform (a noisy choir adds nothing to a sermon). Those factors which he cannot control he must eliminate by suggestion especially if they are genuine counterattractions. The engine which whistles on the siding, the fire truck going down the street, or other such uncontrollable stimuli obviously cannot be eliminated. But the experienced crowd orator weaves these stimuli into his speech. They become a part of the stimulus pattern and not a counterattraction.

(2) *The speaker uses attention-getting devices of high value.* The crowd orator also must know devices of high attention value. Conflict, suspense, human interest, action, humor, and novelty are introduced into his speech. He knows the rules of vividness: That recent events are more vivid than far away occurrences, that often repeated behavior strikes deeper than occasional happenings, and that emotional experiences are more effective than nonemotional experiences. He recognizes the value of the concrete over the abstract, the specific over the general, the pictorial over the nonpictorial, and the

principle that an appeal to many senses is more effective than an appeal to just one.

If he is able at these tasks, he soon has the attention of his audience. Wolbert has suggested the process of development of polarization by stages in Fig. 13.

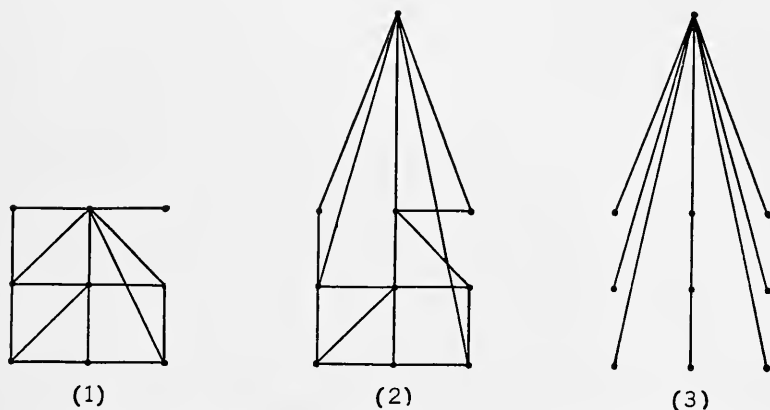


FIG. 13.—ILLUSTRATING THREE LEVELS OF ORGANIZATION OF AN AUDIENCE.

In (1) we have a nonpolarized audience, in which attentions of the members are variously distributed, the leader having not yet appeared. In (2) we have a partially polarized audience, most of the members being partly conscious of their neighbors, although their attention is directed toward the leader. In (3) we have complete polarization, where each member is concentrated upon the leader and is vaguely or not at all conscious of his neighbors. Such a level is usually of short duration. (Adapted from C. H. Woolbert, "The Audience," Psychology Monograph, 1916, Vol. 21.)

In addition to the ability of the speaker, Gurnee has suggested that certain characteristics of the audience contribute to this process; (a) *General receptivity*. Most audiences come predisposed in attitude to hear the speaker. Some audiences may be hostile or disinterested. In this instance, the speaker has a harder task before him and must present material which gains their interest. (b) *Mental homogeneity*. Gurnee points out that individuals of different age, interests, prejudices, etc., make a difficult audience.⁵ A homogeneous audience is obviously easier to unify. (c) *Audience training*. Moreover, audiences with experience are most easily dealt with, for they have already established appropriate responses which aid the speaker.

(3) *Polarization is socially facilitated.* A polarized audience is, however, not a crowd. A crowd does not exist until emotion runs high in an audience and until the speakers' words are reinforced by contributory stimuli from the crowd members. It is granted that an audience, rapt in attention, is more suggestible than a less attentive audience. It will be recalled from the description of suggestion in the previous chapter that suggestion involves a narrowing of the field of consciousness. The techniques of getting attention and removing counterattractions are by their nature methods of restricting the field of consciousness. Hence they are also methods of enhancing suggestibility.

Socially facilitated polarization is a condition of intense attention of audience members to a speaker in which the suggestibility of members is farther enhanced by the contributory stimulation of other audience members. It is as if the members of the audience had become part of the same stimulus field in which the speaker is the dominant object. The contributory stimuli are the background.

(4) *The impression of universality.* The impression of universality is an important feature of crowd behavior. Inasmuch as emotion dies off slowly, expressive behavior often lasts long after the instigating stimulus has passed. A speaker who is quick finds it possible to exploit this psychological moment. While the audience is still applauding some statement which the speaker has made, he presents another idea which would not be usually accepted. Due to the lag of the expressive behavior, the individual as he looks around sees acquiescence upon every hand. The audience has been previously agreeing with the speaker; they still seem to be agreeing with him. Add this condition to the already heightened state of suggestibility and we have the basis for the acceptance of some proposition which under other circumstances would be turned down. When this accepted idea is further projected into the multitude and blessed with their apparent approval, it becomes a proposition which the individual cannot be expected to refuse.

(5) *Other techniques for enhancing suggestibility of audience members.* There are other conditions which aid in increasing the

suggestibility of audience members. The crowd speaker must be fluent. His English may be broken, his pronunciation incorrect, his sentence structure faulty, but his words must flow like a cascade. This gives a rhythm to the speech which has a special effect. Repetition is also effective in increasing suggestibility. "For Brutus is an honorable man" is repeated over and over, each time with increased effect. The progress of enhanced suggestibility should look like a bull stock market chart. The speaker takes the audience a limited distance and allows it to rest a moment and to recede in emotion. But from each valley he takes it to higher peaks. It is very difficult to take an audience from every day passivity to a high state of emotion without stages of rest.

THE OPERATION OF MECHANISMS IN CROWDS

It is now possible to superimpose this crowd description upon different types of crowds. The community crowd passes through certain of these stages in short order. No crowd speaker needs to use special devices to get the attention of such a group if he confines himself to the subject at hand. In a process called milling, group members have already worked themselves up to a fairly high degree of suggestibility. Milling is a form of interstimulation of a direct face-to-face sort. The word has gone round that a sex offense has been committed against a child. The community gathers at the post office to talk the matter over. Everyone is excited. Each intensifies the emotion of the other, but as yet no crowd exists. In the same fashion a class crowd, for example, a labor union on strike, has gone through a preliminary period of preparation. The crowd orator in these situations is handed an audience in a state of high suggestibility which polarizes immediately.

Nor is there any difficulty in producing expressive behavior. Any statement which accords with the prevailing temper is greeted with cheers, any mention of the enemy with boos. The art of crowd making in all three situations is essentially the same in its psychology, but not in the ease with which it is accomplished. The building of an audience from a passive group into a crowd is an art. The polarization of a milling group is merely the acceptance of an invitation. If

one individual does not do it another will. A community or a class crowd finds leaders.

The Class Crowd.—In this type of crowd we have a long history or preparation. Those who are members of labor unions have had experience with past strikes. Many may have been in demonstrations in which either they or some friends were injured. Some of them have been jailed for picketing. Conflict and repression have provided a reservoir of emotion. To go on strike means to go without wages. This means privation and suffering. More than any other thing a “scab,” a nonunion man who will go to work during the strike, is to be hated. Thus there is built up in the worker a background of hostility and hatred.

Moreover, it is not enough to point out the fact that the crowd members in this instance have a background of repression and regimentation. It is also important to see how they localize the causes of their frustration. Their emotion runs highest against “scabs” and against the company, but it may also be oriented against the State. If the workers go on strike, the police prevent their picketing a factory. If the workers attempt to keep “scabs” out by force, the militia is called out to protect lives and property. On the other hand, the education of the individual member has taught him that he should respect private property and lives, that justice is given through the courts, and that as an individual he must abide by these legal attitudes.

The crowd process in this situation becomes a device by which the individual overcomes his scruples about obedience to law, his attitudes about human life, and his fear of the police or the militia. In general, the class crowd is a revolutionary thrust at the state. Through polarization and social facilitation the crowd is raised to a high state of suggestibility. Thus Allport describes a group of strikers who seized a certain number of “scabs” and paraded them through the city. As the line of march proceeded, feelings ran higher and higher. Finally, the leaders became afraid of the situation and advised the “scabs” to run for it. The tail of the crowd started in pursuit and as it passed the leaders they, too, turned and pursued the “scabs,” who were then beaten up.

The Crowd as a Fanatic Public.—Crowd psychology in a fanatic public may show a similar mechanism to that of a class crowd, but it also has points of difference. Generally no history of frustration and deprivation from a common agency exists. A common emotion and a common orientation has to be rather artificially generated from general attitudes arising out of the experiences of life. The "get rich quick" attitudes which characterize such manias as the "Mississippi Bubble," "Tulipmania," "The Florida Land Boom," Auctions, and "Chain Letters" are not felt by the average individual to be attitudes repressed by the "State," or by any other specific agency. They are prepotent attitudes of high emotional value which have not been fully expressed because the average individual has little opportunity to get rich quick. Crowd psychology is used upon these people not to overcome institutional repressions, but to overcome the individual's fund of common sense and to make him accept as a good proposition one which is obviously logically false.

In the same fashion a religious revival is successful because it can exploit a certain reservoir of strong emotional attitudes and find a common orientation for them. The success of religious revivals cannot be traced to frustration which people attribute to a specific institution. Rather it can be traced to frustration by life itself. Tired, discouraged, and unsuccessful individuals present a psychology open to exploitation. The basis of the exploitation is not the overcoming of some institutional attitude, as much as it is a victory over human intelligence. The drunk believes that if he accepts the Christian life he will be saved. The tired and discouraged accept the notion that by humility and service they can secure peace in an after world.

Inasmuch as these types of crowds start from a different and less emotional background, it takes much more effort to bring them to the state of suggestibility necessary for the end sought. The evangelist is trained in the methods of polarization, and of polarizing social facilitation. He often has trained assistants to start the crowd action.

Crowd Psychology as a Technique for Integration.—In the fanatic public the impression of universality and the processes of social projection are utilized for a different purpose than in a class

crowd. In the class crowd these mechanisms of crowd psychology were utilized to allow the individual to rationalize conditions under which he could do what he had been wanting to do all along. In the fanatic public, the techniques are utilized to create a new want in the individual. Moreover the want may be very unusual and the means of satisfying it a bizarre method. Under any other conditions than crowd psychology the new means would be completely repudiated by the common sense of the individual.

The evangelist develops old attitudes regarding childhood life, mother, home, and family. He develops the desire for contentment, rest, and security. He suggests the punishments that flow from sin and dissipation. He concludes with the rewards and satisfactions that arise from genuine repentance. All of these attitudes have a strong emotional value in their own right. Under the influence of crowd psychology, however, they take on an intensity not hitherto recognized. The drunkard signs the pledge and it seems a perfectly reasonable thing to do. Moreover, if he really changes his environment it may represent a genuine conversion. But in most cases the individual returns to his old environment. The stimulating factors of crowd psychology are gone and soon the individual returns to his old ways.

Similarly, the progress of a real estate boom sets off a series of strong positive values. Florida is the land of plenty. It represents a climate where ease and relaxation are possible. There is no heating problem, no winter, no need for winter clothing. It seems reasonable that everybody should be interested in owning land in this climate. Real estate salesmen succeed in starting a movement to Florida. Soon lots are being laid out in every direction. Everybody seems to be on the road to Florida. There are great sums to be made in Florida land. The get-rich-psychology gets stronger and stronger. Many begin to believe it will last forever.

The Crowd as an Indignant Community.—The community crowd presents points of similarity with both class and fanatic crowds. As in the case of the public there is generally no history of systematic repression by some single agent. Such instances as border

warfare in which the community takes common action against marauding Indians are generally not considered as cases of crowd psychology, although they have many common elements. The union of the community in violent counteraction is generally considered as war psychology rather than crowd psychology. Crowd psychology seems more often, in the case of the community, to be used against the violation of the community mores by a single person or a very few individuals.

It should be observed that the mores themselves represent emotional taboos. Although very few individuals in the community may suffer from a particular violation of the code (for it is not their child who has been stolen, their sheep which are being killed, or their relative who has been murdered), still the deed stands as a very "wrong" sort of behavior. Because this fact has been long recognized, there generally exist legally constituted agencies for carrying out the punishment of the offender.

Crowd psychology in this community situation operates not to overcome the state, or to suggest some new unthinkable form of behavior, but to allow individuals to anticipate the usual governmental processes. This they know they are not ordinarily allowed to do, because due process of law is worked out to protect the innocent from being misjudged. As in the class crowd, under the mechanism of crowd behavior the individual finds anonymity. Whereas most often the feeling of universality is on the side of the due process of law, it is now on the side of the proposed crowd behavior. In England where law is carried to swift execution, crowds of this kind are much less frequent. The rationalizations which justify the community crowd are that the courts are slow, the politicians corrupt, and the officials inefficient.

Crowd Psychology as a Failure of the Division of Labor.—

In the community situation the crowd represents a distinct failure of the division of labor. Unlike the class crowd oriented against the state, there is no feeling that the governmental agencies are in the hands of another class. It is rather a feeling that governmental agencies are unable to carry out community will and, therefore, community members take the decision into their own hands.

In some cases, no special agency exists to cope with the infraction of the community code. Many of the early lynchings were really a primitive attempt to set up a method for dealing with violations of the community mores.

Crowd Psychology in General.—Upon the basis of the previous analysis it is possible to comment upon the general theories of crowd psychology in the literature. Thus Martin is very much interested in the logic and violence of the crowd, but is unable to understand the nature of either. He feels all crowds to be paranoiac in the sense that to him they seem to reflect logic tight delusions of grandeur and persecution.

The Logic of Crowds.—There is no essential difference between the logic of men in crowds and their logic elsewhere. This fact seems so potent in the light of modern psychological knowledge and has been so often demonstrated by Pareto, Freud, and others that it hardly bears comment. Men think scientifically only in restricted fields, and then only when their goals are fairly rigidly defined. Nor is the logic of the men in the crowd more of a systematized delusion than is the economic philosophy of the member of parliament. The logical doctrines of any group are principally systematized rationalization of the wants, desires, and motives of the group members. Seldom is group ideology formulated in an objective impersonal manner. It has the emotional and absolutistic characteristics which Martin finds in crowd thinking.

Delusions in Crowd Psychology.—Two characteristics of paranoia are the delusion of persecution and the delusion of grandeur. Two very similar mechanisms are found in crowd psychology. The delusion of the paranoiac is founded upon false reference. He misinterprets the actions of people as directed against himself. His own failure is blamed upon some agent whose reference to himself can be shown to have nothing to do with the matter.

Delusion of Persecution.—Martin seems to believe that the crowd never has grounds for belief in persecution and that this belief must

always be a delusion, or a false judgment. Because some crowds are led to believe that the devil is their enemy and the cause of their misfortune, others that witches are spoiling their crops, still others that the Jews are the cause of their economic misfortunes, Martin would seem to believe that the early settlers were completely deluded in blaming the Indians for the burning of their frontier villages, the feudal serfs and rising bourgeoisie were deluded in blaming the nobility for the restrictions on their economic activities, and that modern riots in connection with strikes and picketing have nothing to do with a clash of interests between workers and management. Because some crowds have no ability to localize correctly the real cause of their misfortunes, he assumes that all crowds lack this ability.

There is, of course, some justice in his claim. The cartoonist who blames the present amount of economic disorder upon conspiring capitalists is distorting the picture. Few of us know of instances in which industrial barons sit up nights attempting to oppress laborers. But this does not mean there is no basis in the real world for the violent disagreements between industrialists and labor unions. Moreover, a group suffering deprivation will often blame the wrong individuals, "the politicians," the "Wall Street banker," or "foreigners and Jews," before it arrives at the correct answer to its problem. This is a complex social world in which we live and few individuals are trained to see it in its entirety and in correct perspective.

Delusion of Grandeur.—The delusion of grandeur, on the other hand, arises from other sources. It is undoubtedly connected with the type of crowd psychology we have already described. Social facilitation, the impression of universality, and social projection do make it seem possible that the crowd members can accomplish anything that they have a mind to accomplish. There is still, of course, one caution that should be sounded. Upon occasion it is probably true that a crowd of sufficient numbers can accomplish what the group members desire. The obstacles to new forms of social behavior are often in the prevailing social norms or in the attitudes and habits of the people. Hence if enough of them are ready to abandon old values, there is little that can be done to prevent it.

Whereas the delusion of grandeur is assumed in paranoia to compensate for feelings of inferiority, a real feeling of immense collective power is a very different thing. The surge of creative enterprise which followed the French Revolution was based upon real fact. The middle classes who found power in that epoch virtually remodeled the world. The path between illusion and fact, between delusion and reality, is often hard to detect.

Mixed Crowd Types.—Studies of southern lynching mobs show that not all southern crowd behavior directed against the Negro stems from the same motivational base. One pattern, for example, is very close to the community crowd in that the dominant white group is attempting to preserve its privileged position. A. Raper calls this the *Bourbon* type of lynching.⁶ Leading citizens will participate and a specific person is punished for a specific crime. The mob does not get out of hand, and the purpose is clearly to maintain the accepted norms of the community. Another pattern is found, however, which Raper calls the *proletariat* lynching. This occurs in areas where the poor whites are in economic competition with the Negroes. The aggression is directed more generally against all Negroes and the crowd behavior tends to be more brutal. In this type of crowd we are dealing with motives found both in the class crowd and in the fanatic public. For some crowd members who see the Negro as the cause of their economic plight, the motivation is similar to that of the class crowd. For others, however, the crowd situation represents not an opportunity to remove the conditions responsible for deprivation, but rather a chance to gain release for pent-up hostility and sadism engendered by their generally frustrating position in southern society.

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CHAPTER VIII

THE INFLUENCE OF THE GROUP UPON SOCIAL BEHAVIOR AND ATTITUDES

By DANIEL KATZ, *University of Michigan*

Although isolated experiments had appeared earlier, experimental social psychology got its impetus in this country from the research of F. H. Allport in 1919 on the influence of the group on individual performance. The study of behavior under group conditions remains the central area for laboratory investigation in social psychology. Findings from such studies have already found their way into a preceding chapter, but in this discussion we shall focus upon typical experiments on group effects.

EXPERIMENTS ON GROUP EFFECTS

Facilitating and Inhibiting Effects.—The results of the Allport study indicating an increase of gross motor performance in the co-acting group and a decrease in quality of mental performance¹ have been substantiated by other investigators, although Allport's original interpretation has had to be qualified. Dashiell has demonstrated, for example, that the increased performance in the group situation can be attributed more to uncontrolled competitive factors than to social facilitation.² The work of Whittemore indicates that the voluntary assumption of a competitive attitude with no change in objective conditions will speed up performance.³ But the fact remains that a co-working group without any stimulus to competition in the immediate situation will perform more actively than isolated individuals.

Lorenz, experimenting in a factory situation, compared individuals working alone and in the group, and also compared a group with division of labor against individual effort.⁴ He found the group

cooperative performance 40 per cent more efficient than that of the isolated individual—of which 10 per cent could be attributed to reinforcement of voluntary effort by the visible and audible working tempo of the group.

An interesting application of the *inhibiting effect of the group* upon performance for a minority of individuals can be seen in the work of L. E. Travis with stutterers.⁵ Ten stutterers took a free association test in an “alone” and a “together” situation. Eight of the ten stutterers produced more associations when working alone than when working together. Apparently the social embarrassment characteristics of stutterers carries over from their *spoken* to their *written* responses.

The Leveling Effect: Convergence Upon a Group Norm.—

The early work of Moede revealed a leveling effect in the group situation, that is, a speeding up of the slow individuals and a slowing down of the fastest workers.⁶ Lorenz's results on factory workers confirmed this finding. In a given group of workers around a table the fastest worker was slowed down but not too the extent that the slowest worker was speeded up. He even found this tendency between table-groups. A good group located between two poor groups suffered a decrement in efficiency, whereas a poor group between two good groups raised its level of efficiency.

People not only adjust their performance to the tempo of their co-workers, they also modify their opinions and judgments in the direction of a group norm. F. H. Allport had subjects judge the heaviness of lifted weights and the pleasantness of odors alone and in a group situation.¹ In the group situation the judgments were not made aloud so that individuals did not know how others were reacting. In spite of the fact that there was no publicized majority opinion, individuals tended to avoid extreme judgments in the group. They converged much more on a norm in the social situation than in their isolated judgments.

Approaching the problem from another angle M. Sherif demonstrated the growth of a group norm in perceptual judgments in a laboratory situation.⁷ Sherif took the autokinetic phenomenon as an unstructured situation where social suggestion might work effectively.

In the traditional autokinetic experiment the subject fixates upon a point of light in a dark room. Although the light is stationary, the subject generally sees it as moving up and to the side, partly because the customary visual framework with its anchoring points is lacking. Sherif had groups of three or four subjects reporting the perceived movements aloud. Gradually, they converged on a group norm and, although there was still some range in their individual judgments, the range was limited and the norm and range were characteristic of the group. Once an individual had this group experience, his later judgments when alone were still close to the old group norm. The implication is that the norms we build up in our own group experience are effective in the determination of our behavior when we are not in the original group situation. Sherif found, moreover, that some of his subjects who were permitted to build up their own individual norms before the group experience were not as readily affected, when they were later put in the group situation, by what their colleagues reported.

These findings are consistent with the work of Moore and others on the effect of majority opinion. People temper their opinions and beliefs in relation to what others are saying and doing and move consciously or unconsciously toward a group norm.

Effects of Group Discussion.—A number of experiments have been concerned with the effects of group discussions on problems of fact and upon the solution of intellectual problems. Anglo-Saxon law relies upon the group to evaluate the facts in a criminal trial: The assumption is that discussion and deliberation by twelve men will give a more valid judgment than the estimate of any one person and further that discussion will help in the process of determining truth.

The experiments on the effects of group discussion have attacked four problems: (1) How does discussion affect the accuracy and adequacy of judgment about the perceptions of the members of the group? (2) How does it affect the accuracy of their judgment in evaluating the testimony of others? (3) How does it affect the solution of intellectual problems, and (4) how does it affect their social judgments on questions of value?

The pioneer work on the first problem goes back to Münsterberg's study in 1914. Münsterberg presented to his classes cards containing a large number of dots in random clusters.⁸ Students made individual judgments as to which card had the most designs. After discussion they made a second judgment. In a class of graduate students there was a change from a vote 51 per cent correct to a vote 78 per cent correct, but in an undergraduate class there was no significant improvement. Bekhterev and Lange studied the influence of group discussion on the estimation of time and on visual perception.⁹ Subjects were asked to estimate the time-interval between two taps on the desk—an interval of one minute and a half. More people approximated the truth after, than before, the discussion. In another experiment thirteen subjects were asked to report the differences between two sets of pictures of each of six well-known animals. Before discussion 33 correct and 9 incorrect details were noted and after discussion 40 correct details and 2 incorrect. A third group was asked to note the similarities between a picture of an adult woman and a girl. Discussion raised the number of resemblances appreciably.

Although the interchange of ideas in the discussion process helps to raise the level of the group over the initial judgment, an important factor is the diversity of original opinion and the knowledge of how others differ. Jenness had students estimate the number of beans in a jar and then divided the students into discussion groups on a selective basis.¹⁰ One set of groups contained students who had been very close in their original estimates; the other set of groups contained people who differed widely from one another. Of the groups representing diversity of opinion, twenty of the twenty-six individuals improved their judgments, and their mean error was reduced 60 per cent. Of the groups representing homogeneity of opinion, twelve of the twenty-four individuals did better, but their mean error was reduced only 17 per cent.

The second problem, the effect of discussion upon the evaluation of the testimony of others, has been attacked most thoroughly by J. F. Dashiell.² He staged an incident in one of his classes and afterward called two students, one who sat near and one who sat far, to describe what had happened before seven student-jurors from

a legal psychology course. A stenographic record was taken for the experimenter's use only. Each juror then wrote out as complete a story of the incident as he could from his memory and interpretation of the reports of the two witnesses. Then the jurors met and discussed what had happened and finally agreed on an account of the incident. The results were: (1) the individual jurors were not as complete in their accounts as either of the witnesses, (2) the individual jurors in the accuracy of their accounts were not as good as the more accurate witness and not as poor as the less accurate witness, (3) the group report was not as full as the report of either witness nor even as complete as that of individual jurors, (4) *the group verdict was more accurate than that of any individual witness or juror*; it reduced the individual jurors' average error by 59 per cent.

In another series of experiments Dashiell presented a dramatic and humorous motion picture to groups of from three to five witnesses. These witnesses were brought one at a time before juries of twelve to fifteen individuals and gave as full an account of the movie as they could recall. After hearing the witnesses the jurymen wrote out individual versions of what they could piece together from the narratives of the witnesses. Then they were broken up into groups of three or five for discussion and deliberation until the group could agree on an essential version of the original movie. In all, 24 juries were used and in every instance the final jury verdict was more accurate than the average account of its component members. Of the 109 jurymen, only 14 gave scores which were better than, or as good as, their group scores.

Group Discussion and Problem Solution.—Group discussion has been studied in relation to its efficacy in the solution of intellectual problems. Here the emphasis is not upon the evaluation of testimony but upon problem solution. The superiority of group discussion is established only if its achievements are greater than the pooled average of the component members working alone.

G. B. Watson compared group cooperation with individual performance in tasks varying in difficulty from sentence comprehension to solving a cipher code.¹¹ Alternative forms, of equivalent difficulty,

were formulated for all tasks so that they could be attacked by the same individuals first in an alone situation, second in a committee or discussion session, and third in an alone situation again. The group method proved to be better in all tasks than average individual performance. The difference was very slight on the comprehension test but large on the sentence-completion problems.

The most complete work on the comparison of the cooperating group and the individual in the solution of rational problems has been done by M. E. Shaw.¹² The problems Shaw used involved a number of steps all of which had to be correct for the real solution to be reached. For example, in one problem the subjects were given six disks, H_1 , H_2 , H_3 , W_1 , W_2 , W_3 , and were told that on the A side of a river were three wives (W_1 , W_2 , W_3) and their husbands (H_1 , H_2 , H_3). The point of the problem was to get them across to the B side of the river by means of a boat carrying only three at a time under the conditions (a) that no wife was to be in the presence of another man unless her husband was also there, and (b) that all the men, but none of the women, could row.

Groups of four worked in separate rooms and each person had an opportunity to react to the suggestion of another person. Another set of subjects tackled the problems individually. After two weeks those who had worked in groups were given new problems, this time to be solved individually, while the individual workers were now put into groups of four for cooperative problem-solving. Written records were kept by an observer of the interaction process in each group.

The results showed clear-cut proof of the superiority of group cooperation. In the first half of the experiment the individual workers achieved only *five* out of a possible *sixty-three* correct solutions, whereas the group produced *eight* correct solutions out of a possible *fifteen*. The second part of the experiment confirmed these findings. Even groups deliberately selected not to overrepresent good problem solvers proved superior to individual workers.

The better record of the group is explained by the facts noted during the observation process. The group checked its work more carefully than did the individuals and rejected incorrect suggestions. The rejection process in the group also will turn down correct suggestions on occasion but five times as many incorrect suggestions

were voted down as correct ones. Of the total number of suggestions twice as many were correct as incorrect. Moreover, the errors of one person are spotted more quickly by another person than by the individual himself. In the group situation two and a half times as many incorrect suggestions were rejected by another as by the proposer. When working alone the individual often got off to a false start and never did gain insight into his own error. In the group this error was much more likely to be detected in the very beginning.

These results on the superiority of the group to the individual, on perception, on evaluation of the perception of others, and on the solution of rational problems, cannot be generalized to cover the evaluation of social problems. The basic values of people may be so involved in the situation that group interaction may merely confirm fear, as in the crowd, or intensify conflict between two opposed factions. Bringing people together around a table to settle differences is not a sufficient condition to insure success. It is true that the group conference method can be used effectively but only under certain conditions and through the use of certain techniques as in the Lewin experiments presently to be discussed.

If, in the group discussion, an objective and problem attitude can be taken, then it is very probable that some of the benefits of group interaction in problem-solving situations will obtain. Bekhterev and Lange, in their experimentation, have demonstrated this in a problem involving social values.⁹ Twenty-four public school teachers in a course on child study were shown two pictures. The first picture shows a boy stealing apples in an orchard with a gardener appearing with a stick. In the second picture the gardener has caught the boy and is giving him a beating. The teachers first wrote down their impressions of what they had seen and then their judgment of the situation. They then discussed the matter in a group and again recorded their judgments. A number of important changes appeared as the result of the discussion. Before the discussion only one person had made the point that beating is a mistake from an educational point of view; afterward this comment appeared in twelve of the reports. Similarly only one person had taken the

position that beating is barbarous before the group meeting, whereas twenty-two took this position afterward. And it occurred to only three people originally that the boy's motivation should be considered, whereas after discussion eighteen thought that if hunger had been the motive, punishment was not in order. This experiment shows how people in a group will readily accept an idea which had not originally occurred to them and sometimes even give it major emphasis.

GROUP ATMOSPHERES

Authoritarian, Democratic, and Laissez-Faire Atmospheres.

—Early experimental work had established the tradition of research centering largely on the quantitative dimension of the superiority of the group or on the leveling effect of the group situation. The investigation of qualitative changes and the exploration of the complexities of group atmospheres is a late development and is largely the work of K. Lewin and his followers. One of the most famous experiments of the Lewinian school was the study of authoritarian, democratic, and laissez-faire group atmospheres by Lewin, Lippitt, and White.¹³

In one series of experiments four clubs of five ten-year-old boys were set up. The clubs were matched as far as possible on intellectual and physical traits, socio-economic status, personality characteristics, and patterns of interpersonal relationships. Three different group atmospheres were established through different types of leadership control on the following bases:

Authoritarian

1. All determining of policy by the leader.
2. Dictation of procedures and activities a step at a time with no knowledge given to group of over-all plan.
3. The leader assigned work tasks and work companions.
4. The leader directed his praise and criticism personally rather than objectively and remained aloof from group participation except when demonstrating.

Democratic

1. Policies determined by group discussion and group decision, with the encouragement and assistance of the leader.
2. Over-all plan and steps for reaching group goal discussed.
3. Work assignments determined by group and members make their own choice of work companions.
4. Praise and criticism by leader objectively rather than personally directed; leader attempted to be group member without doing too much work.

Laissez-Faire

1. Complete freedom to group about policies with minimum of leader participation.
2. Leader contributed materials and stated he would supply information when asked, but took no other part in activity of group.
3. Leader did not participate in any way in assignment of work tasks or work comparisons.
4. No attempt at evaluation or regulation of group activity.

Club activities were equated by having the democratic clubs meet first and determine what their activities should be. The authoritarian group was then given the same activities and the laissez-faire group the same materials furnished the other groups. To equate the personalities of leaders, the leaders were rotated in the different group atmosphere situations. Stenographic and observation records were kept on all groups. In addition the boys were interviewed as were their parents and teachers during and after the experiments.

Effects of the Three Atmospheres.—The authoritarian situation produced two distinct types of reaction: An apathetic or submissive pattern and an aggressive pattern. The submissive groups showed great dependency upon the leader and no capacity for initiating action. The aggressive group, on the other hand, gave evidence of frustration and some channelized aggression against the leader.

Morale in the sense of spontaneous cohesion in the group, working together toward common goals and possessing a *we*-feeling, was

highest in the democratic groups. Among the groups working in a democratic atmosphere the ratio of *We* to *I* references was higher than the laissez-faire or the two types of authoritarian reaction. There was more friendliness exhibited in the democratic situation and less discontent.

FRIENDLY REMARKS MADE BY AVERAGE GROUP MEMBERS TO
OTHER GROUP MEMBERS IN ONE-HOUR MEETING

Democracy	26.1
Autocracy (aggressive pattern)	21.7
Laissez faire	20.6
Autocracy (submissive pattern)	17.1

Discontent of Average Member

	<i>Expressed to Leader</i>	<i>To Members</i>	<i>Total</i>
Democracy	0.8	0.8	1.6
Laissez-faire	1.5	3.1	4.6
Autocracy (submissive)	2.0	2.1	4.1
Autocracy (aggressive)	11.1	4.4	15.5

Expressions of irritability and aggressiveness toward fellow members were found more frequently in both the authoritarian and the laissez-faire groups than in the democratic atmosphere. In the first series of experiments the aggressive authoritarian group developed interpersonal tension and scapegoating. The demands for attention from the adult leader were greater in the authoritarian social climate than in the other situations. In the submissive autocracy the usual sociability of the children was strikingly inhibited. There was a low total volume of child-to-child conversation.

Although the authoritarian submissive group showed the most sustained intensive work of any of the groups, this was true only when the leader was present. When the leader arrived late, the authoritarian groups showed no initiative in starting new tasks or resuming the work already under way, whereas the democratic group had its work in process even though the leader was not there.

The authoritarian situation produced lower group morale in part because the rewards came not from the activity itself but from

praise from the leader. In the democratic situation praise could come from the other boys. Thus, in the autocratic group there was ego-centered competition for approval from the leader. And praise to one boy meant that the others were losing out and further destroyed their group identification. In the democratic situation the boy could become oriented toward group goals and not be concerned about the recognition others were getting from the leader.

Corroboration of the Lippitt-White findings on the democratic versus authoritarian atmospheres appears in the work of the Mowrers in a children's community center.¹⁴ The center was a home for children in whose families problems had occurred such as divorce or death—necessitating the temporary or permanent institutionalizing of the child. As a semi-private agency the center restricted its more permanent population to about twenty-five children. The Mowrers ran the center one year according to the traditional pattern of a benevolent authoritarian regime. The children had no part in the making of rules, nor in decisions about rewards or punishments, nor in the important activities of the group. Rules were clearly explained to the children and a system of external rewards and punishments was followed in terms of objective fairness. The following year the Mowrers shifted to a democratic regime under which the children participated in decision making. They were not given complete freedom but they did take part in the making of the rules. They had their own courts and juries for determining guilt and punishment, save that an adult intervened to lessen the severity of their verdicts.

The similarity between the results reported by the Mowrers and by Lippitt and White is more convincing in that both sets of observations were made in different contexts. The Lippitt-White study was experimentally designed with better controls, but it was limited to experimental manipulation affecting only a limited play period for the children involved. In the Mowrer setup an entire life situation was studied. Experimental controls were lacking because the Mowrers did not set up their two regimes for experimental purposes. They originally followed a traditional pattern with confidence in its efficacy and then became convinced of the desirability of a change. Nevertheless, both the Lippitt-White and the Mowrer study report

essentially the same effects of democratic versus authoritarian procedures.

THE GROUP AS A MEANS OF SOCIAL CHANGE

As a matter of fact, the scientific study of group atmospheres has lagged behind the practices of skilled group workers. Some of the more skillful practitioners have utilized principles of democratic participation and group involvement of the individual in mobilizing group effort, building morale, and changing group attitudes. Impressed by these workers and the early results of the democratic group-experiments with children, the Lewinian school has begun experiments on the adult level. This research has been directed at the problem of changing the attitudes and habits of people. To change the long-standing attitudes and habits of adults is a difficult task, and the principles involved in such modification of behavior are important for almost all fields of psychology.

Group Decision and Action.—One of the first experiments on group change through involvement of participating members was carried on during World War II in the attempt to get American housewives to forego the choice cuts of meat and to increase the use of beef hearts, sweetbreads, and kidneys.¹⁵ Six groups of Red Cross volunteers organized for home nursing were utilized in the experiment. Only a forty-five minute session was available to the experimenters. In three of the six groups the lecture approach was used in which the problem of nutrition was linked to the war effort and in which charts were used to show the nutritional values of the nonpreferred foods. The lecturer aroused interest by telling of her own success with her family and the recipes she employed. In the other three groups a different procedure was followed. The problem was presented to the group and again linked to the war effort. But now a discussion was started in which the housewives themselves participated. It was focused on how other housewives could be made to use the nonpreferred foods, on the obstacles to such new practices and the methods of overcoming them. The food expert was brought in to answer questions. At the end of the discussion

the women were asked by a show of hands to indicate who was willing to try one of the foods within the next week. A follow-up showed a striking difference between the two methods. Only 3 per cent of the women in the lecture groups served one of the meats never served before, whereas 33 per cent of the women in the discussion groups served one of these foods.

Similar superiority for group involvement and group decision over lecture and instruction were found in the two other experiments on food habits. The first concerned the increase of the home consumption of milk among housewives grouped according to the neighborhood they lived in. Three groups were given as interesting a lecture as possible, whereas the other three groups followed the step-by-step discussion process. Check-ups made two and four weeks afterward showed that the group discussion had been much more effective in increasing the consumption of milk. One point of interest in this experiment was that the group-discussion leader was not a trained group worker as in the study of use of nonpreferred meats. The results are not to be attributed, therefore, to the personal skill of an experienced group worker.

The second experiment followed a similar procedure, but in this case the objective was to increase the use of orange juice and cod-liver oil by farm mothers in feeding their babies. Moreover, individual instruction rather than lecture was used for half of the subjects and group discussion for the other half. Even though the individual instruction meant more attention by the expert for every mother in the one group, this method was definitely inferior to group decision. Follow-ups two and four weeks afterward showed many more farm mothers from the half employing group discussion feeding their babies orange juice and cod-liver oil than from the half receiving individual instruction.

Group Decision and Industrial Morale.—The importance of group participation and group decision has also been established in raising the level of performance in industry.¹⁶ Experienced sewing-machine operators in one factory held brief meetings with the psychologist in the plant once a week for three weeks. They discussed the production goal which they thought they could maintain

and came to the conclusion in the first meeting that they could get production up to 84 units per hour even though the standard had previously been 60 units and the ceiling had been assumed to be 75 units. After the group decision, the goal of 84 was achieved. At the second meeting, the group raised the goal to 94 units but found this too high. At the third meeting, they decided to make 90 units the customary goal for five weeks. An actual production rate of 87 was maintained not only for the five weeks but for months thereafter. Control groups were used in the experiment in which the psychologist met with workers and asked for higher goals. In these groups, however, where group participation and decision did not occur, there was no significant increase in productivity.

Changes in work methods are difficult to introduce among workers especially when they call for the elimination of worker-skill through mechanization or simplification of the job. In one garment manufacturing plant where the company had to simplify production procedures to meet competition, J. R. French conducted an experiment in the use of group-participation.¹⁷ In most of the company the change was carried out in the usual manner by an edict from management, with the characteristic falling off in productivity. In a few work groups, however, the employees were called together and presented the problem. They discussed the matter and finally concluded that the best solution was a simplification of operation, very similar to the new methods being introduced in other work groups by the company. Having made the decision themselves, however, they proceeded to put it into effect with an actual increase in productivity.

Why Group Decisions Are Effective.—These experiments furnish a dramatic example of the role of the group in changing the behavior and attitudes of the individual. Kurt Lewin, in his theoretical explanation, postulates a state of equilibrium in a group with a fairly constant level of performance. The level is the resolution of forces acting to raise performance and forces of resistance acting to lower it. This frozen or stable level can be broken by the introduction of new forces. If these new forces are additional factors making for a higher level of performance they may be only temporarily effective. If, however, the equilibrium is upset by removing

the resistance-forces, the new level of performance can be permanently maintained. For example, if we attempt to raise the level of racial tolerance in a community we can increase the forces operating to make people tolerant by appeals to their fairness or their belief in democracy. After the campaign is over, however, we may find that the community slips back to its former level of behavior. If, however, we work with the resistances within the individuals through group methods and change their basic attitudes, the resulting change in tolerance will be a permanent gain.

There are two basic processes operative in group involvement and group decision which account for the greater modification of behavior or the greater increase in performance through group methods. One process derives from the individual's dependence upon the group. We need the assurance and support of our fellows. On the fringe of consciousness there is almost always an awareness that others expect us to behave according to the group norm. From early childhood on we have developed social behavior as part of a reciprocal pattern of mutual group expectation. To act correctly we must see our own behavior mirrored in the actions of the group. If our acquaintances and friends were not to see the world as we do, were not to express the same attitudes, were not to accept and recognize our ideas, we would be completely demoralized. S. Asch, in a series of experiments, has demonstrated the shattering effect of making an individual a deviant from his group on simple perceptual interpretations. The other members of the group cooperated with the experimenter in giving perceptual judgments contrary to the observations of one of the group who did not know that he was being "framed." The deviant under this pressure was torn between conforming to the group and making the judgment which had always seemed right to him before.

This dependence upon the group is more than a desire for general social approval. While we want society in general to recognize and reward us, we are most forcefully affected by the people immediately about us, by the face-to-face groups in which we have formal or informal membership. And we are influenced in those immediate day-to-day activities which are mirrored in the behavior of our

associates. "Experience in leadership training, in changing food habits, work production, criminality, alcoholism, prejudices," writes Kurt Lewin, "all indicate that it is usually easier to change individuals formed into a group than to change any one of them separately."

Another process is at work in the experiments on change through group participation and group decision. These activities bring into play the powerful forces of ego motivation. The individual who takes part in the planning and decision making can now regard the new group goal as his own. To make our own decisions gives us a feeling of strength and freedom as well as a sense of importance. To help work out the group plan gives an opportunity for the expression of our abilities as well as a feeling of being identified with something greater than ourselves. Most of the routine work of the world is carried on through external motivators—through reward and punishment not intrinsic to the work itself. When, however, internal sources of motivation are tapped through giving the individuals a chance to make the work their own, we find dramatic increases in performance. This is in part the secret of the high morale and unusual accomplishments of Carlson's raiders in World War II.

The process of internalizing motivation through the use of ego drives and the process of group reinforcement previously described are definitely related to one another. Frequently the egoism of the individual is repressed in the interests of conformity to the group norm. Freudian psychology is based upon the opposition between the socialized prohibitions of group norms which are interiorized as the super-ego and the selfish, individualistic, primitive desires. The method of group participation and group decision, however, minimize this conflict because the individual himself helps to determine the group norm. Thus two powerful sets of forces, often in opposition, can now combine and reinforce one another.

It is also true that in changing group attitudes and habits, it is difficult to oppose the group sanctions already in existence. They can be modified by attempting to introduce sanctions of a more potent source, but it is more effective to modify the group sanction in the direction desired. This can be done most readily through the democratic action of the group itself.

THE EFFECT OF GROUP MEMBERSHIP UPON THE VALUES AND ATTITUDES OF THE INDIVIDUAL

Development of Racial Attitudes.—The social norms of our culture are acquired in good part through membership, formal and informal, in the many groups of our society. The Hartleys in their study of the development of attitudes toward Negroes have shown that it is not contact with Negroes but contact with the prevalent attitude of home, neighborhood, and other groupings toward Negroes that determines prejudice.¹⁸ Once attitudes and beliefs have been formed through early group membership, the interesting problem remains as to their amenability to change in later life as the individual acquires membership in new and different groups. In many primitive cultures and in feudal society this problem is of minor importance since the groupings are few and on the whole compatible in their values. In our dynamic society, however, people are socially mobile and in the course of their life history enter many different groups. The degree to which they are changed as they become part of a new group depends upon many factors: for example, the intensity of the original attitudes, their reinforcement through contact with past associations, the psychological age of the individual, the purpose and role of the individual in the new group setting, the relation between old values and the present group goals. Research in this area has already produced some interesting findings.

Sims and Patrick measured the attitudes of three groups of students toward the Negro: (1) *A southern group*, that is, students coming from southern homes attending the University of Alabama, (2) *a north-in-the-south group*, that is, students coming from northern homes attending the University of Alabama, and (3) *a northern group*, that is, students from northern homes attending Ohio University.¹⁹ The northern group was the most favorable toward the Negro, the southern group the least favorable, and the north-in-south group occupied an intermediate position between the two. There were no significant differences between the classes in the southern group in degree of prejudice, but prejudice among the north-in-south group increased steadily with year in college. These results suggest strongly that the northern students take on the attitudes of the southern culture the longer they live in it. It is, of course, possible

that there is another explanation: That only the northern students who like southern values stay on for four years at a southern university; the others drop out or transfer. The following study of T. Newcomb indicates that the first interpretation is the correct one.²⁰

Changes of Attitudes in a College Community.—The college community of Bennington was studied between the years 1935-1939. Bennington College at the time of the study was unusual in its emphasis upon individual guidance and instruction, in its informality, and in its small groups. It was a self-contained, well-integrated community with an alert attitude toward public affairs and a more liberal point-of-view toward social and economic problems than most colleges. Attitudes of students were measured on eleven different social issues, including the New Deal, internationalism, the Civil War in Spain, the CIO, the Munich settlement. Information tests on public affairs were also employed. Student ratings were made in which students rated one another on various aspects of community citizenship.

As in the Sims-Patrick study the seniors showed attitudes much more characteristic of the group values than did freshmen. In this instance, however, the attitudes became progressively more liberal with class in college. Newcomb established, moreover, that the increasing liberalism was not due to the possible selective factor of the more conservative students leaving the Bennington community. Follow-up scores on the same students through their four years showed an increasing liberalism. In other words, there was definite evidence that membership in the Bennington community meant the taking on of the social and political values of the group. Moreover, as liberalism increased there was an increasing knowledge of the specific public issues of the day. Not all students took on the color of their environment to the same degree, however. The students who participated most actively in college affairs and who were rated as the highest in community citizenship were the ones who took over most completely the liberal values of the community. Membership in the group, to use Newcomb's words, "involved the taking on of whole patterns of interrelated behavior."

Principles of Social Change.—The assimilation of group values by individual members is part of the broader problem of the individual basis of social change. Individuals may take on new attitudes not only as they acquire membership in a new group but as they come into contact with different ways of life of other groups. Tarde's old contention, however, was that imitation proceeds from the inner to the outer man, that key values have to be accepted before their external manifestations are acquired.²¹ In general, the assimilation of ideas and practices does follow this principle. Thus the Amish, a religious sect in Pennsylvania, have preserved until recently their distinctive way of life and have remained a sub-culture fairly impervious to the main trends of American society. The reason was that they rejected the basic values of a materialistic and mechanized civilization. Similarly, feudal society maintained its stability through its belief in traditional doctrines which endowed man-made institutions with hereditary and supernatural qualities.

But even this generalization of Tarde's is subject to exception. People will adopt material improvements in life even when they run counter to older values. The feudal order was finally undermined because the nobility welcomed the necessities and luxuries made possible by traders and by their own artisans and increasingly relaxed feudal rules so that they could receive more of the good things of life. In a similar fashion immigrant groups have become assimilated to the American culture pattern by their willingness to accept some of the material advantages of its way of life. In a research investigation by Carpenter and Katz on acculturation of Poles in an American city, three generations of Poles were interviewed.²² The changes toward American culture were first in the direction of accepting American mechanical conveniences such as refrigerators and vacuum cleaners. Gradually they accepted American health practices and finally the ideas and attitudes of the dominant culture were acquired. Thus, while Tarde's generalization of imitation proceeding from the inner to the outer man is the dominant principle, a slow process of acculturation in which the modification of specific bits of behavior can undermine key values is also possible.

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CHAPTER IX

ABNORMAL PSYCHOLOGY

THE SIGNIFICANCE AND CAUSES OF ABNORMAL BEHAVIOR

By LAURANCE F. SHAFFER, *Columbia University*

Unusual or abnormal human behavior invariably arouses popular interest. When a newcomer moves into a community he is soon evaluated by his neighbors. If he converses about the weather or about his garden, he is a commonplace fellow and interest in him develops slowly. But let him paint his garage a bright pink with blue trimmings, and the response will be quite different. Or, suppose that the newcomer tells about a nation-wide plot against himself, that he is the victim of a sinister and far-reaching conspiracy all of whose members are seeking to injure him personally. Immediately gossip is rife, and the man receives more than his share of attention. Thus the touch of abnormality arouses widespread concern and curiosity. Abnormal psychology shares this appeal, for it endeavors to explain human conduct and thought that cannot be understood in terms of ordinary common sense.

WHAT IS ABNORMAL PSYCHOLOGY?

Pictures of Abnormalities.—The subject matter of abnormal psychology is encountered in everyday life, but usually is poorly observed and incorrectly understood. Therefore it is necessary to picture some of its problems before attempting to define the field precisely, since the conditions may be unfamiliar to students. The following illustrations describe only the “present condition” of the individuals; any attempt to trace their histories or to ascertain the causes of their disabilities must be deferred until later. The first four cases are patients in mental hospitals.

Withdrawing.—(Case 1). The patient is a young woman about 24 years of age. She walks stiffly across the room when propelled by a nurse, but does not sit down when a chair is offered her. Pushed into the chair, she sits in an uncomfortable position which she makes no move to remedy. In fact, she remains motionless for five minutes and does not respond to questions. When her arm is lifted to an awkward horizontal position she allows it to remain there, holding the arm rigid for a longer time than a normal person could. She has not spoken a word since her admission five months ago, and ignores the relatives who visit her. She will not feed herself, but swallows food that is placed in her mouth. This patient shows a very complete *withdrawal* from the usual activities of living.

Deterioration.—(Case 2). A mature man walks with a dragging, slovenly gait, has tremors of the hands, and shakes almost constantly. The most striking symptoms are revealed by his answers to questions of common information. Asked his age, he at first says that he doesn't know; he would have to look at a calendar. Later he says that he is 29. (His real age is 36.) He knows the name of the present President of the United States, but not that of the preceding president. He can give his name, but looks puzzled when asked where he is. Simple arithmetic problems are answered incorrectly: Four times two is forty, five plus ten is one hundred. He does not know the date. This man shows marked *deterioration of intellectual functions* that he once could perform. He is also said to be *disoriented* as to time and place.

Distorted Thinking.—(Case 3). This young man hears voices that speak to him constantly, sometimes scolding him and sometimes giving him instructions (*hallucinations*). He talks freely, however, and is eager to give an account of his experiences. He says that he received a course in X-ray work by radio. As a result of this instruction, he can throw X-rays from his eyes and can look through solid substances. He can see into the ground and has discovered treasures of gold, silvery, and jewelry. People are jealous of this great power, he says, and his wife tried to poison him. He recovered some of the treasures from the ground, but "three gentlemen, one of them Her-

bert Hoover," stole his power. He steadfastly holds to these *delusions*, or distorted beliefs, and cannot be persuaded of their falsity.

Excessive Variations in Activity.—(Case 4). A woman about 50 years old talks in a low and moaning voice. She answers questions very slowly, but the replies are relevant and correct. She knows her name, her age, the date, and where she is. She says that she does not feel well, that "her head isn't right." She is worried constantly. When asked what she worries about she replies, "Everything." This woman weeps frequently and seems overwhelmed with disaster. She is *depressed* and also retarded in her speech and movements.

A year later, this same woman presents a striking contrast. She is now laughing and active, and talks so rapidly that one can hardly understand what she says. She runs up and down the corridor, and shows a great amount of muscular activity. Sleeping very little, she keeps up a prattle of talk, song, and laughter all day and most of the night. She is still capable intellectually and answers questions correctly when her attention can be secured, although she tends to give joking replies. At times she tears off her clothing, not viciously but gaily. She is *agitated*, *accelerated*, and is said to show *manic* symptoms.

In addition to the serious conditions that usually require hospitalization, abnormal psychology also studies the minor deviations of behavior that are found among persons in ordinary walks of life. There are many forms of these less severe disorders of behavior of which only one will be illustrated now.

Fearful Behavior.—(Case 5). A college sophomore was questioned by the head of his department after he had persistently refused to recite in class. The young man confessed that he is unable to speak in public because of an uncontrollable fear that seizes him whenever such a demand is made. If compelled to recite he becomes very red in the face, his heart pounds wildly, and at times his throat seems to become paralyzed so that he cannot talk. He is a fairly capable student and has been able to pass his courses because he suffers no difficulty in expressing himself on written examinations,

or in performing laboratory work. He believes that these symptoms are caused by a defective heart, but a careful examination by a physician reveals no organic heart disease. The heart symptoms probably arise from the physiological effects of emotion. The fundamental problem is his abnormally fearful reaction to public speaking.

The Definition of Abnormal Behavior.—Abnormal psychology is the application of scientific psychology to the study of abnormal behavior. Having illustrated some typical abnormalities of behavior, the next task is to make a more precise definition of “abnormal.”

Abnormal Behavior as Different Behavior.—Fundamentally, “abnormal” means *deviating from some average or standard*. By derivation, the word signifies *ab*, “away from,” a *norm* or average. Abnormal behavior is therefore different behavior, conduct that is not like that of most of mankind. All important human characteristics exist in various degrees. People differ in height, in visual acuity, in health, and in numerous other physical, psychological, and social characteristics. They also differ in excitement or apathy, exaltation or depression, flighty fancy or stubborn tenacity. To be sufficiently different in some of these respects is to be abnormal.

The conception of abnormality as different behavior leads to one especially important conclusion. Abnormality exists in various *degrees*. Everyone knows that all people cannot be classed as short or tall. Instead, there are all quantities of height between the extreme cases. Similarly, all forms of behavior cannot be classed as normal or abnormal. For example, the characteristic of elation-depression exists in many gradations. The person who is extremely elated, constantly shouting, laughing, and singing, is clearly abnormal in this respect. So is an individual who is very depressed and who moans continually about his misery. But there are also persons who are a little overactive, or quite neutral, or a little depressed. Traits are not divisible into two classifications, or into three, but show many small variations in quantity. Variations in degree extend continuously from the average to both extremes. Therefore, all persons cannot

be classified precisely as "sane" or "insane," but only as possessing a greater or less degree of some characteristic.

Abnormal Behavior as Inadequate Adjustment.—The concept of abnormal behavior as different behavior needs to be supplemented by another criterion. There still remain the questions of the *direction* of deviation, and of the *amount* of difference that must exist in order for behavior to be called abnormal.

In the sense of the first definition of abnormality, any great deviation from average is abnormal. In practice, however, good variations are distinguished from unfortunate ones. Persons who display broad social participation and leadership, a superior capacity for rational thinking, or a high intelligence are not considered abnormal, while the opposite extremes of withdrawal, delusion, and deterioration are so regarded. In some traits, such as elation-depression, both extremes are abnormal. This is because both great joy and great grief hinder effective social adjustment and prevent the achievement of life purposes. The "good" extremes, in general, facilitate the accomplishment of social and individual adjustment. Of course, what is a good adjustment depends considerably upon social opinion. A deluded individual might become the "medicine man," of a primitive tribe, or even the leader of some religious or political sect in a civilized group.

The definition of how much an individual must vary to be abnormal is also a matter of social opinion. In a complex city environment a man who mutters constantly to himself might be judged abnormal, whereas he might adjust well enough on a lonely farm or as a solitary trapper. Both the direction and the degree of deviation that will be considered abnormal depend on their effect upon the total adjustments of the individual.

"Mental" Disorders.—Another way that abnormal psychology is often defined is to say that it deals with "mental" disorders. This is a convenient term, since it distinguishes the subject matter of abnormal psychology from other abnormalities, such as physical, physiological, economic, or social ones. The term "mental" is troublesome, however, for it seems to ascribe the conditions to some realm

of "mind" that was once believed to be quite separate from the physical body. Today, the word "mental" means no more than *psychological*. Psychology is the study of man as a whole individual as he adjusts to his environment. Psychological disorders, or mental disorders, are therefore abnormalities of whole conduct, of perceiving, of thinking, and of adjusting. Calling these abnormalities "mental" merely distinguishes them from other disorders, but does not explain them.

Psychiatry and Psychology.—Two professions that deal with abnormal behavior, psychiatry and psychology, are often confused by laymen. *Psychiatry* is a medical specialty that deals with the diagnosis and treatment of the behavior disorders. A *psychiatrist* is a medical doctor who has taken postgraduate work beyond his M.D. degree to gain the knowledge and skill required to understand and treat mental disorders. The subject matters of psychiatry and abnormal psychology are very similar. As bodies of knowledge, psychiatry is more oriented toward practical problems of description and care, whereas abnormal psychology is somewhat more concerned with research and theory.

In clinics and hospitals that care for mentally disordered persons, psychiatrists ordinarily assume the major responsibilities for diagnosis and treatment. This is appropriate, since many of the concepts and techniques of general medicine apply to those who are mentally ill as well as to the physically sick. In many modern clinics and hospitals, *clinical psychologists* collaborate with psychiatrists. The clinical psychologist (see Ch. XIV), whose doctoral degree is in psychology rather than in medicine, contributes to diagnosis especially through the use of psychological tests, often participates in the psychological aspects of treatment, and carries out research. A third member of the typical clinic team is the *psychiatric social worker*, whose distinctive contributions are obtaining the social case history of the patient, studying significant aspects of home and other social factors in his background, and working helpfully with his family.

THE SIGNIFICANCE OF ABNORMAL BEHAVIOR

The extent, cost, and significance of mental disorders are often unappreciated by those who do not have professional contact with them.

The Major Abnormalities.—The greatest loss, both in money and in human values, arises from the serious disorders that ordinarily require hospitalization. These most severe conditions are termed *psychoses*, and the patients are referred to as *psychotic*.

Extent.—At any one time, there are about 580,000 patients in mental hospitals in the United States.¹ In the course of a year approximately 142,000 new patients are admitted, and about 44,000 former patients are readmitted for further care. In a typical recent year, about 126,000 patients are discharged from the hospitals as cured, improved, or able to live with their families. About 46,000 patients per year die in mental hospitals, a figure that is not high when we consider that an appreciable percentage of patients are elderly people suffering from disorders of senility.

There is a large turnover in the population of mental hospitals, so that many more persons are psychotic at some time in their lives than are affected at any one date. It is also believed that many mentally disordered persons are not in hospitals, but are cared for at home or in institutions for the aged or indigent. Summarized in terms of the general population, some approximate figures about the frequency of mental disorders are:

(1) About 5 of every thousand persons are in a mental hospital at some time during each year.

(2) About 15 of every thousand persons are seriously in need of psychiatric care, whether hospitalized or not.

(3) Of every thousand persons born, about 50 will be in a mental hospital at some time during their lives.²

The pessimistic tone of the above statements must be offset by a more reassuring fact. There is no evidence that mental disorders are increasing, or that any more people are breaking down under the alleged increased stress of modern life. It is true that the number

of patients in mental hospitals is rising (from 450,000 in 1935 to 580,000 in 1945),³ but this represents the increased provision of hospitals for persons needing care, and the improved acceptance by the public of mental hospital facilities. No one need worry about a rapidly increasing rate of "insanity" because of these figures.

Cost.—The cost of maintaining state mental hospitals in the United States was about \$165,000,000 in 1945.⁴ This is not the entire cost, since state hospitals provide care for 85 per cent of patients, others being in veterans', county, city, and private institutions. State hospitals employed about 63,000 staff members. About half of all hospital beds in the United States are in psychiatric hospitals. These figures show that serious mental disorders represent an economic problem of considerable importance.

The Minor Abnormalities.—The minor deviations from healthful adjustive behavior are less severe than the psychoses, but they are much more numerous. Most of these less serious disorders fall into the class of the *psychoneuroses*, and include abnormal fears, anxiety, and a number of other conditions that are described in the next chapter.

Extent.—It is difficult to estimate the extent of the psychoneuroses, since cases seldom are hospitalized and often do not even consult a physician. The proportion of psychoneuroses in the general population must be very large, however, if some estimates and judgments can be trusted. Many physicians have estimated that at least half of all medical patients suffer from psychological disorders rather than solely from physical disease. This includes the vast number of "nervous" persons, some persons who go to physicians because they mistake the accelerated heartbeat of emotion for an organic heart condition (as in Case 5, previously described), and many others. Some authorities have estimated that almost every person is at least a little psychoneurotic at some time in his life, and that about 10 per cent of the population is affected all of the time. Several surveys of the mental health of industrial employees have shown that psychoneuroses are a significant problem in business. From 12 to 20

per cent of the employees of department stores have been found to be handicapped by "nervousness" or other psychoneuroses.⁵ In a careful study of a large number of industrial and clerical employees in Great Britain, 30.6 per cent were found to display noticeable psychoneurotic symptoms.⁶

Social Significance.—The social significance of abnormal behavior goes far beyond the statistical and economic facts. A very large proportion of human misery is associated with psychological ills. Persons who cannot get along with their fellow men, who are quarrelsome and uncooperative or else timid and fearful, suffer from psychological maladjustments. Other maladjusted persons include those who cannot retain employment because of peculiar personal traits, those who cannot live at peace with their parents, husbands, wives, or children, and those who are always "just miserable." Abnormal psychology presents a way of understanding these forms of behavior, and, in some instances, points toward their control and cure.

The study of abnormal psychology has another broader social significance. Literature, drama, and history are full of characters who can be understood only in terms of abnormalities of behavior. Some of these personages show major mental disorders, and many more of them display the lesser deviations of behavior. Individuals who are queer or unusual are more interesting than ordinary people; hence they are frequently found in literature, and also in history. Not only do Hamlet and Macbeth become more understandable through the study of abnormal psychology, but also Cæsar and Napoleon.

TWO INTERPRETATIONS OF ABNORMALITY

There are two chief interpretations of mental abnormalities, both of which must be examined if a thorough understanding is to be achieved. These points of view may be illustrated by a simple example. Suppose that we say to each of two persons, "Lift up your hand!" Neither one of them complies. The causes of these failures to follow our directions may now be investigated. One individual, we will discover, is totally deaf. Some years ago he suffered an

infectious disease that attacked the inner ear and permanently damaged its mechanism. The other person, however, is not deaf, nor does he show any other organic disability. But he is a native Frenchman, has never learned English, and hence cannot understand what we say to him. Thus behavior may be affected by a deficiency of *structure*, or by a deficient *functioning* of a normal structure. Broadly speaking, the functional variations are caused by what a person has *learned* or by what he has *not learned*.

The Neurophysiological Interpretation.—Neurology and physiology view the individual as a complex machine. Any failure of this machine to function satisfactorily, then, must be explained as a defect in the mechanism, some part being out of order. The maloperation may be caused by the destruction of some part of the nervous system by an accidental injury or by a disease process. This falls within the province of the *neurologist*, whose specialty is a detailed knowledge of the structure of the neural pathways. Or, the nervous system may be prevented from operating properly by an externally acquired poison such as alcohol, or by some internally secreted toxic substance. A part of the field of physiology is concerned with these conditions.

The psychologist cannot ignore the neurophysiological interpretation if he is to achieve a comprehensive understanding of mental disorders. Although the *causes* implied by these interpretations are not within the field of psychology, their *results* are unmistakably psychological. If, as a result of neurophysiological disorders, the individual shows disturbances of behavior, cannot remember, or does not reason or judge adequately, then psychologists must be interested in these causes and must include them in any study of abnormal psychology.

The Psychological Interpretation.—Psychology sees the individual as a striving organism, constantly trying to satisfy his needs in his environment. Its chief concepts are therefore a person's motives, frustrations, conflicts, and adjustments, rather than his neurones or his chemical composition. The fundamental principles of abnormal psychology come from normal experimental psychology.

The ways in which individuals learn their adjustments are basically the same whether the end result is normal behavior or abnormal behavior. Wrong answers or right answers, whether to school questions or to life problems, are learned by essentially the same processes.

The psychological point of view holds that abnormal behavior is an inadequate adjustment to a conflict between the needs of the individual and the demands of the environment, resulting from an unfortunate learning process. An illustration will make this clear. A five-year-old child in kindergarten never talks, does not join in the activities of the other children, and only cringes and withdraws when the teacher speaks to him. His behavior might be due to extreme deafness, or to mental deficiency, in which case the physiological hypothesis would be fruitful. Examination, however, reveals that he is neither deaf nor feeble-minded. Further study of his home life shows that his parents quarrel frequently and bitterly, that his father pays little attention to him except to punish his misdeeds, and that his mother concentrates her affection on a younger sister, regarding the little boy as "bad" like his father. As an adjustment, the child has *learned* to withdraw and to be silent and fearful. The principal concepts of the psychological approach can be drawn from this example. The child has certain needs for activity and expression and also has strong needs for affection and security. His environment causes a conflict between these needs, for whenever he does something he is scolded or punished. He resolves this conflict by withdrawal, to escape the threat of the loss of his parents' love. The same processes are seen in adults as well as children. People learn to be overaggressive, to hold false beliefs, to fear, or to show other abnormalities, as a result of the inadequate solution of adjustive conflicts.

The psychological approach is not antagonistic to the physiological type of explanation. Physiological changes occur in the nervous system whenever a person adjusts or learns. The psychological hypothesis explains mental disorder in terms of the socially unfortunate operation of an *intact* nervous system, rather than in terms of diseases or injuries of the nervous system.

From the descriptions of the two hypotheses, the student must not conclude that some mental disorders are entirely physiological,

while others have only a psychological basis. Instead, all mental disorders are probably due to some combination of *both* kinds of causes. There are differences among mental disorders, however, in the degree to which neurophysiological or psychological approaches are applicable. Some disorders are more physiological, some more psychological, but both factors enter all cases in some measure.

STRUCTURAL DEFECTS AND ABNORMAL BEHAVIOR

The neurophysiological point of view has been strikingly successful in explaining some forms of mental abnormality. This approach is very complex, since the anatomy of the nervous system is exceedingly intricate, and the injuries and disorders that may affect it are even more so. It is impossible to describe many details of the neurophysiological approach in a book of this scope, but a few samples may be cited with some simplification to show how the neurophysiologist goes about his work. A spinal disorder, one involving a limited part of the brain, and one that affects the brain generally, will be used as examples.

An Ataxia.—(Case 6). A not infrequent sight on the street is a man who walks with a peculiar gait, assisting himself with a cane. His legs are thrust far apart, are thrown forward irregularly, and are brought to the ground with a sharp stamp, the knee being held stiffly. Both legs are affected. This is the picture of *tabes dorsalis* or “locomotor ataxia,” a condition that can be explained quite satisfactorily from the neurophysiological point of view. The disorder as a whole has other symptoms, including severe pains in the legs, gastric crises, and impairment of the skin senses. We will consider here only the *ataxia* or motor incoordination of the legs.

A clinical examination of a case of *tabes dorsalis* reveals certain features of the disorder in more detail. The patient can stand erect with his eyes open so that he can watch his surroundings, but sways and falls when his eyes are closed. The knee-jerk reflex is likely to be diminished or absent. The pupillary reflex of the eye is peculiar, for the pupil contracts normally when accommodating to distant vision, but does not contract when a light is made to shine in the

eye. If the patient is asked to put his finger on his nose with his eyes closed, his aim is found to be very poor. Various other tests show that the man has lost the kinaesthetic or muscle sense of the movement and position of parts of his body. He does not "know where his feet are" unless he watches them. This is a kind of sensory impairment, therefore, and the man walks poorly because he lacks the normal "feel" of movement.

The disorder can be located even more specifically by the neurologist. It is due to a degeneration of the posterior columns of the

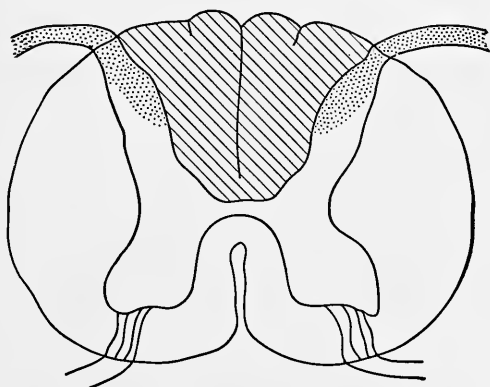


FIG. 14.—TYPICAL SPINAL CORD DEGENERATION IN *Tabes Dorsalis*.

The shaded area represents the damage to the posterior columns which carry the impulses for the sensations of movement, balance, and equilibrium to higher centers. The sensory nerve roots are also affected as shown by the dotted areas.

spinal chord (see Fig. 14). Through these columns of neurones pass the kinaesthetic impulses from the peripheral nerves to the brain. The damage causes the effect that has been noted, the loss of kinæsthesia. Moreover, this condition is due, in an overwhelming majority of cases, to a syphilitic infection of the cord that particularly affects these posterior columns. The neurologist can thus give a complete picture of this disorder in terms of neural mechanisms.

An Aphasia.—(Case 7). An accumulation of gas in a business building exploded with great violence just as a street car was passing. Many passengers in the car were injured, including one young man

who suffered a severe skull fracture when a piece of steel penetrated his brain from the left side just above the ear. He survived this injury rather remarkably, but when the first shock was over it was discovered that he could not talk. He understood language fairly well and was able to communicate by means of signs and gestures, but when he tried to speak only a meaningless jargon passed his lips. This case belongs in the broad class of *aphasia*, a disorder involving the ability to communicate by means of words.

Aphasia, of the structural sort here considered, is caused by an injury to the brain areas that control the language functions (Fig. 15). These are located at the side of each half of the cerebrum, the

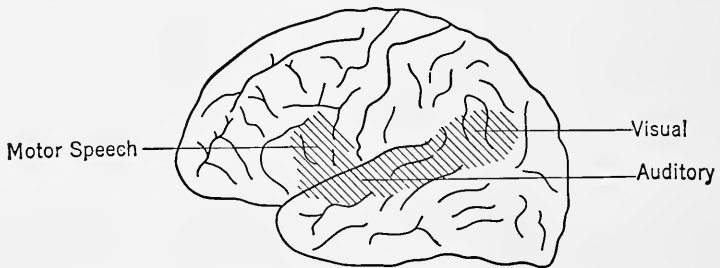


FIG. 15.—BRAIN AREAS MOST OFTEN DAMAGED IN CASES OF APHASIA.

The left hemisphere of the cerebrum is represented. The shaded area in the frontal lobe is affected in *motor aphasia*, that in the temporal lobe in *auditory aphasia*, and that in the parieto-occipital lobe in *visual aphasia*.

left hemisphere being more important in right-handed persons. Parts of each of the four lobes of the brain are involved, each correlated to some extent with distinct functions. According to the classical view of aphasia which is somewhat disputed by some authorities, there are two main sorts of this disorder, *motor aphasia* and *sensory aphasia*. The case described here is principally of the motor variety. The young man's ability to understand language is little affected, but he cannot make the complex coordinations necessary for speech. This function is ascribed to a part of the frontal lobe. Among the sensory aphasia are distinguished *auditory aphasia*, the inability to understand spoken language, and *visual aphasia*, the loss of ability to read. Most actual cases of aphasia cannot be classified into these categories sharply, both because the brain functions are not so clearly

differentiated as the classical theory would imply, and because injuries usually affect more than one limited area.

Many cases of aphasia recover gradually. The young man described was wordless for ten days, then nurses succeeded in teaching him to say a few simple words, such as "drink," "orange," and "milk." After three months he had relearned his vocabulary fairly well and would pass for a normal person. Examinations of the brains of aphasic persons, and analogous experiments with lower animals, show that the damaged brain area does not recover its former functions. Instead these processes are taken over by adjacent undamaged areas as re-education goes on. If too wide a damage has occurred the possibility of retraining may be very limited.

A General Neural Infection.—(Case 8). A man in a mental hospital shows a variety of symptoms, three of which will receive particular attention. First, he displays a notable *ataxia*, somewhat like that of Case 6. He has a shuffling gait, a general incoordination of movement, and shows the same clinical reflex signs as did the case of ataxia. Second, he shows rather pronounced *mental deterioration*, like that of Case 2, described on page 260. He does not know the date, where he is, or who his associates are. His information is scanty, and he cannot perform arithmetical tasks. The neurophysiologist, from these symptoms and others, recognizes this as a case of *paresis*, a general syphilitic infection of the nervous system. Asked to explain the intellectual deterioration, the neurologist will say that the entire brain is affected, and this observation has been widely confirmed. Moreover, the cause of the infection is known to be syphilitic, a very valuable fact.

But the patient shows a third kind of symptom of even greater psychological interest. He has "expansive" *delusions* of a very intense nature. When questioned, he says that he has millions of dollars, hundreds of wives, and thousands of children. He is a king, a president, a general, or God. The hospital is his palace, and all of the other patients are his servants. How are these delusions explained by the neurological approach? The neurologist says again that the whole brain is affected, which is true enough, but not sufficiently specific. It explains the poor judgment that permits a delusion to

be harbored, but it does not explain the source of the delusion itself. There is something positive about a delusion that cannot be dismissed merely as a "weakness of judgment." Moreover, not all paretics show expansive delusions. Some simply deteriorate, some are depressed, while others are agitated. There are no known differences in brain degeneration that distinguish these types. Psychiatrists usually point to the patient's past history, to his *habits*, as the factor that leads to one type or another of parietic behavior. Thus the psychological theory is brought to bear where the neurological theory leaves off.

Merits and Shortcomings of the Neurophysiological Approach.—The neurological and physiological explanations of mental disorders have the advantages of being definite and practical. They are satisfying because they point to the identifiable defects in the present structure of the man that make him act as he does. This approach is practical because it suggests definite methods of treatment and prevention. Many neurological defects due to diseases or tumors can be cured by medicine or surgery. Paresis can be prevented by the eradication of the syphilis from which it develops.

The neurophysiological interpretation is at its best when it deals with relatively simple and limited disorders such as paralyses, ataxias and aphasias. It provides an invaluable background for many of the more complex disorders, but it cannot cope with problems involving the individual's whole behavior and thought. For these conditions the psychological approach is also necessary, since the basic explanations arise from the individual's habits of adjustment.

PSYCHOLOGICAL CONFLICTS AND ABNORMAL BEHAVIOR

The psychological interpretation of abnormal behavior is based on concepts such as need, conflict, and adjustment, that also apply to normal people. Everyone has to adjust. Abnormal people are those who achieve less satisfactory solutions of their life problems.

The Adjustive Process.—The course of life may be regarded as a series of adjustments in which each person modifies his behavior

in response to the combined situation created by his needs and his ability to satisfy these needs. To be normal, an individual must adjust flexibly. He must show varied responses that are appropriate to each situation encountered and that are successful in fulfilling his motives.

Some of the simpler aspects of adjustment have been investigated by animal and human experiments, as well as by observations from everyday life. The familiar problem-box and maze experiments illustrate this process clearly. At the outset, the animal is motivated by some physiological need; he is hungry, thirsty, or confined. The fulfillment of this need is prevented by the conditions of the environment and by his inability to cope with these conditions. Next, he engages in varied, trial-and-error activity until he discovers a solution that leads to the reward and reduces his drive. The total adjustment process can be outlined in four concepts: (1) *Motive*, (2) *thwarting*, (3) *varied responses*, and (4) *solution*.

The same sequence may be observed in the complex social adjustments of human beings. If a man loses his job not only are his economic needs thwarted, but also his important social motives such as the needs for social approval, recognition, and prestige. In making a normal constructive adjustment, the man searches and makes inquiries (varied responses) until he secures another position (solution).

A notable thing about human social adjustment is the tendency to make *inadequate substitute solutions*. Instead of looking for a job, the man may sit at home and nourish grievances against the economic system. Or, he may blame others for his lack of employment, claim he is persecuted, or demand that others support him. These inadequate substitute solutions are of the greatest interest to abnormal psychology.

Motives.—The motives that evoke adjustive behavior are conveniently classed as *physiological needs* such as hunger, and *social motives* such as the desire for approval. In highly developed cultures, in which the physiological needs are satisfied, the social motives are most significant for adjustment. Human social motives are very complex, and cannot be reduced satisfactorily to a list of names.

They are acquired, chiefly in childhood, by learning processes determined by the culture. When a person has an unsatisfied need, he feels tense, uneasy, and ready to respond. Hence, the basis of motivation is often called *tension*, and the satisfaction of a motive results in *tension reduction*. From the inevitable helplessness and dependence of childhood, persons learn basic social needs for *security, conformity, recognition, social approval, praise rather than scorn, gregariousness*, and the like. The demands for competitive achievement made by our culture cause people to acquire strong motives for *pre-eminence, mastery, excelling rivals, overcoming obstructions*, etc. The thwarting of social motives often leads to inadequate adjustments.

Frustration and Conflict.—Broadly, a thwarting is a circumstance that prevents the satisfaction of a motive. Two main classes of thwarting have been distinguished—frustration and conflict.

Frustration is defined as situational thwarting, in which motive fulfillment is blocked by external obstacles or by the activities of other persons. A child is frustrated when a desired object is on a shelf too high for him to reach or when a parent or teacher forbids him to take it. Both experimental evidence and ordinary experience show that simple frustration rarely leads to serious adjustive difficulty. When frustrated, you usually persist until a solution is found, or else relinquish the goal if it is unattainable. In many instances, frustration leads to *aggression*, to an angry attack on the thing or person that stands in the way. The generalization that aggression is a predictable result of frustration helps in understanding the behavior of some people, such as adolescent delinquents, and of groups, as “underdog” nations.

Conflict is motivational or internal thwarting. If two or more incompatible motives are aroused in the same situation, a person must choose one of them, compromise, or remain futilely stirred up. Everyone has some conflicts, and most of them are resolved with reasonable success. Conflicts of very basic and well-learned motives often cannot be compromised except by very inadequate sub-

stitute solutions, however, and these underlie many psychological abnormalities.

Experiments on Conflicts.—The effects of conflicts are demonstrated by a number of experiments. In one series of studies,⁷ cats were trained to open a food box and eat when a light and buzzer signal were given. Then a conflict was produced by giving the cats an electric shock and a blast of compressed air at the moment of feeding. The conflict involved tendencies to approach and desire the food and also to fear and avoid it. The cats showed several abnormalities of behavior. They displayed *anxiety*, trembling, mew-ing, and disturbances of heart rate and respiration. They avoided the food box, and sometimes even refused to eat in their living cages. There was defensive and substitutive behavior, including excessive preening, hyperactivity, and aggressive acts against other animals. The “breakdown” had a permanent and widespread effect on the cat, as it lasted for months even when there was no more stimulation in the apparatus, and affected the cat’s behavior in ordinary situations. The striking effects of conflict were in contrast to those of mere frustration. When they were frustrated by locking the food box, or by barring the way to it with a glass partition, no cats became “neurotic.”

Some earlier experiments using the conditioned-reaction technique also throw some light on conflict.⁸ A dog was first trained to respond by salivation to one stimulus—for example, the visual presentation of a circle—and not to respond to a similar stimulus, an ellipse. Dogs readily learned this discrimination and would respond to one signal and not to the other. The stimuli were then made gradually more alike, as by making the ellipse approach the shape of the circle, until the animal could no longer discriminate. The situation could then be described as a conflict—the animal had a tendency both to respond and not to respond to the stimulus. In this experiment, some dogs “broke down”; they salivated indiscriminately for many stimuli, barked, whined, tore at the harness, and showed physiological evidence of intense emotional reactions. The effects were persistent. In later series of experiments, one dog remained

"neurotic" for ten years, and one sheep for thirteen years after the induction of a conflict.⁹

Experiments, and confirming evidence from case studies of maladjusted persons, show that conflict plays a dual role. Faced with an unresolvable conflict, a person becomes excessively emotional and is in some degree lacking in rational control of his own behavior. Conflict is therefore a precipitating cause of maladjustment. The enduring effects of conflict suggest that intense unsolved conflicts in childhood may lead to serious changes in personality, so as to make all future adjustments more difficult.

Sources of Human Conflicts.—The most severe conflicts of childhood arise from the relations of a child to his parents. Children are always dependent on their parents for support, and also for affection and approval. When parents are excessively cold or unresponsive, when they use punishment as the only technique of control, the child may develop *basic insecurity*. He both loves his parents and fears them. Almost all people experience this conflict in a mild degree, but when it is severe an anxious, "nervous" personality may ensue. Such a child carries into adult life an excessive craving for affection and a fear that it will be withdrawn, which hampers all his relationships with people.

Other conflicts may arise at all stages of human development. A boy who has a strong fear of being hurt or of failure has a conflict when playing with other boys. He wants to play, but he fears the result of his want, which is the essence of conflict. Both in childhood and among adults, there is a strong motive to excel, succeed, and get ahead of others. But people have also learned the opposite motives of being considerate and of seeking approval. As a result many people who try to push ahead feel guilty about their own aggressiveness, giving rise to a conflict.

Inadequate Adjustments.—A man who is frustrated or in conflict is in a stirred-up, tense condition. The stimulation of his original motive remains unreduced. Furthermore, his tension is reinforced by the typical emotional response resulting from conflict, which is usually termed *anxiety*. Anxiety is akin to fear and is a

response to anticipated catastrophe, to a highly motivated situation in which a person feels helpless and unable to achieve any constructive solution.

In normal adjustment, a man seeks the satisfaction of his motives. The results, of course, may vary considerably in quality. If the need is for mastery or pre-eminence, a person may secure satisfaction by actual achievement in his work, by substitute achievements in hobbies or sports, or by joining some group or movement that makes him feel important. These are not undesirable solutions.

In abnormal adjustment, the individual is driven not so much by a need for positive satisfaction as by the need to reduce his anxiety. He may be fearful of the steps required for real achievement, but he *must* bring about some sort of a compromise adjustment in order to relieve his discomfort. If he needs mastery but fears competition, he might resolve the conflict by finding excuses for his lack of accomplishment, by exaggerating his disabilities, by daydreaming of greatness, or by developing a belief that people are persecuting him. All of these are somewhat tension reducing because they help to relieve anxiety when real accomplishment is inhibited. These illustrations lead to the core of the psychological interpretation of mental disorders. *The abnormal behavior tends to reduce the anxiety of the individual's conflict.* The understanding of a psychological symptom is therefore clarified by asking questions such as these: "What adjustive need does the symptom fulfill?" "What anxiety or conflict does it conceal or reduce?" "What is the individual gaining from his abnormality?" When these questions can be answered, the causes of the abnormality can be discovered.

Consciousness in Adjustment.—It must not be supposed that anyone deliberately chooses to be maladjusted or neurotic. Even quite normal people are not very clearly aware of their motives and how they satisfy them. They lack *insight*, or, to state the same fact in other words, many of their important adjustments are *unconscious*. The concept of unconscious motivation and conflict is an important one in psychology, but is often misunderstood. There is no part of the "mind" called the "unconscious" to which painful conflicts and rejected impulses are banished. Instead, unconscious should be

understood as a functional concept, as a way of acting, not as a thing or place. Many motives and conflicts are unconscious because they are learned early in life, before they are verbalized. Others become unconscious as a means of adjustment. To "not think about" a painful subject is one way of adjusting to it, a way in which people become surprisingly adept.

Maladjusted and neurotic persons "stumble upon" their adjustive solutions because they reduce anxiety. On doing some act or thinking of some idea, the person vaguely "feels better." He would be quite unable to tell why. Thus many adjustive habits are acquired because they satisfy motives or reduce anxieties, not because they are rationally or consciously selected. No person would choose to become deluded, but an individual with delusions gradually acquires his distorted ways of thinking because they help him to compromise or relieve some of his personal needs.

Personality.—Maladjustments and mental disorders rarely make a sudden appearance; instead, they develop gradually over long periods of time. An investigation of the past history of a maladjusted person will reveal that he has shown for a long time traits of personality that lead to his final state. A person who withdraws acutely is found to have had a shy, retiring, excessively quiet disposition in the past. The deluded person is likely to be described as "always suspicious of others and conceited about his own abilities." From these facts, the theory has evolved that the *personality* of the individual is the basic or predisposing cause of abnormality. This is a valuable theory but is susceptible to a serious misinterpretation.

The individual does not act as he does "because" he belongs to a certain personality type. Instead, what is called his personality type is merely evidence of the habits of adjustment that he already has acquired. A theory of inherent personality types therefore puts the cart before the horse. It is incorrect to say that a person withdraws because he has a withdrawing or "introvertive" personality. The withdrawing behavior shows that the individual's experiences and training have taught him to use this form of adjustive reaction, rather than others. Fearful, self-centered, excuse-making, withdrawing, or complaining personalities are the *end results* of processes

of adjustive learning, rather than the sources of these adjustments. In keeping with this interpretation, an individual's personality may be defined as his *persistent habits of making certain kinds or qualities of adjustment*. This is the most useful conception for a psychological theory of abnormal behavior.

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CHAPTER X
ABNORMAL PSYCHOLOGY
THE MINOR ABNORMALITIES

By LAURANCE F. SHAFFER, *Columbia University*

MALADJUSTMENTS IN EVERYDAY LIFE

The concepts of abnormal psychology apply not only to persons who are seriously disordered, but also to many characteristics of normal people. Most individuals are normal in the sense that their reactions are common, usual, and not too much out of keeping with their life aims. But no one is perfect, and every person shows at least some small signs of inadequate adjustment. "The abnormal psychology of normal people" is a significant field of study, for it contributes to an understanding of one's own behavior more directly than does any other branch of psychology. It is also a necessary preparation for the study of the more serious disorders. No one can understand the nature of "delusions" unless the concepts of "compensation" and "rationalization" first are understood. This chapter describes some of the applications of abnormal psychology to normal behavior, and to a number of the less seriously disabling abnormalities.

Adjustment Mechanisms.—The habits by which persons satisfy their motives are known as *mechanisms*. If, for example, an individual adjusts to a need for recognition by showing-off, exhibiting loud and boisterous behavior, and interrupting others, these responses constitute his mechanisms of adjustment. It is convenient to give names to related groups of adjustive responses. Those in the example just cited are known as "attention-getting mechanisms," a term that describes their nature and utility. Every person shows many mechanisms of adjustment, and all mechanisms are therefore normal in the statistical sense. Mechanisms vary greatly in adjustive merit, however, and in the intensity and frequency with which they are used. An individual who is comparatively well adjusted, or one who is in

the early exploratory stages of a difficult adjustment, tends to use many different mechanisms in his trial and error. This is desirable, for by trying many adjustive responses he is likely to hit upon a satisfactory one. In the later stages of maladjustment a person may limit his adjustive behavior to one mechanism that becomes the dominant factor in his personality. This is characteristic of the more serious disorders.

Defense Mechanisms.—The *defense mechanisms* constitute one very important and inclusive class of adjustive habits. Defensive behavior consists of responses that tend to make up for, conceal, or disguise a personal defect or conflict. Defense mechanisms are employed to adjust to a thwarting caused by a subjective inferiority. If a person believes that his inability to satisfy his motives arises from inferior strength, skill, appearance, intelligence, or social status, he is likely to behave defensively. The subjectively sensed inferiority has little relationship to real ability. Some able people believe themselves inferior, while many incompetent persons are never troubled with such thoughts. Defense mechanisms, then, do not arise from genuine inability, but from subjective factors in the individual's personality. A long period of habit formation, usually beginning in childhood, establishes a fearful reaction to personal criticism. This may be caused by experiences such as excessive scolding and punishment at home, ridicule or physical torments from playmates, or persistent failures in school. An individual who has learned this fearful attitude is always ready to believe his own inability and hence to act defensively. Defensive habits set up in childhood are often carried into later life, long after their original causes have disappeared. Since all persons experience some situations in childhood that are productive of an attitude of inferiority, all show defense mechanisms in some degree. Only the more severe and prolonged defenses are mental abnormalities.

Aggressive Defenses.—Defense mechanisms are divided into two convenient, if somewhat arbitrary, groups. First, there are the defenses that are relatively aggressive in nature usually involving social participation. A second class consists of the withdrawing defenses, characterized by retreat from social situations.

Compensation.—A compensation is a pseudo-achievement, developed as a defense against the imputation of failure in real achievements. Compensations have two adjustive values. They are substitutes for genuine achievement, and therefore indirectly fulfill the motives that have been frustrated. Also, they distract the individual from thinking about his shortcomings, and direct the attention of others to his substitute accomplishments.

Compensations are easily detected in many behavior problems of children. One boy was referred to a clinic because of persistent troublemaking in school and bullying on the playgrounds. He also stole small articles from stores in the neighborhood. Investigation showed that beneath this aggressive exterior, the boy had a severe attitude of inferiority toward his physical abilities. He had suffered an unusual number of injuries during the few years before, breaking bones three times while engaged in active play. Consequently he shunned contacts with other youngsters of his age. His motives for physical mastery and for recognition found compensatory outlets in classroom disorder and in bullying younger children. He stole to appear a "tough guy" before his companions. Thus he strove to conceal his fear of being puny by compensatory aggressiveness.

Compensation appears in many other forms. Lack of social recognition may give rise to attention-getting mechanisms, especially in young or naïve persons. Intellectual shortcomings have their typical compensations. For example, a mechanic employed by a college, who was constantly thrown into the company of more educated persons, became addicted to the use (and misuse!) of very long words, thus endeavoring to disguise his lack of formal schooling. Parents often endeavor to secure compensation through the accomplishments of their children, and therefore urge the youngsters into careers that they themselves would have liked to pursue. Many hypermoral attitudes are compensatory in character, for often an individual tries to overcome his own temptations by loudly preaching the opposite virtue. The reformed drunkard is proverbially the best temperance lecturer.

The results of compensation are not always unfortunate. If an individual is prevented from real achievement by unavoidable circumstances, compensations in the forms of hobbies, collections, and

other avocational interests may represent the best way of securing a passable adjustment. On the other hand, evidences of compensation can be found in some of the behavior of the seriously mentally disordered.

Identification.—Another common defense mechanism is identification, in which the individual secures motive-satisfactions by participating in the achievements of other persons or groups. A person “identifies himself” with another individual or with an organization. Identifications occur at all ages, ranging from the child’s pride in his father’s position, through the collegian’s adulation of the football captain, to the adult’s participation in lodges, societies, and political parties. Identification is a normal source of adjustive satisfaction, but is also seen in extreme abnormalities. It is basic, for example, to delusions of identity, in which patients believe that they *are* a god, a king, or a Napoleon.

Projection.—As a means of defense against tendencies that he will not admit in himself, an individual will sometimes ascribe these same desires to other people. A student with a strong temptation to cheat will see evidence that everyone around him is cribbing. A prudish person is sometimes one who is struggling with sexual drives that he regards as unworthy, hence he sees obscenity in every book and theatrical performance. The tendency to be oversensitive about one’s own weaknesses, and to detect them more readily in others, is a common human adjustive trait. It is also characteristic of some delusions, such as those of persecution. If a mentally disordered person is suppressing a tendency to do away with his family, he may easily shift to a belief that they are trying to poison him.

Rationalization.—As compensation is to conduct, so rationalization is to thinking. The person who rationalizes gives “good” reasons to justify courses of action that he believes to be inferior, or else to excuse away his shortcomings. Normal rationalizations are illustrated by the excuse-making that follows having failed an examination, having been reprimanded by one’s employer, or having lost a set of tennis. In these situations it is very consoling to believe, re-

spectively, that the instructor was unfair, that the mistake was made by someone else, or that one's racket must be restrung.

The habit of "passing the buck," verbally and in thought, to explain every failure is closely related to the structure of many delusions. The patient who believes that he has been imprisoned in order that others may get his money is spared the embarrassment of recognizing his mental breakdown.

Withdrawing Defenses.—A rather different type of defensive behavior is illustrated by simple withdrawing or *seclusiveness*. An individual who is frustrated in his social adjustments may give up the attempt to adjust socially, and may withdraw from the stimuli that cause his difficulties. Seclusive persons shun the company of people, prefer solitary amusements to competitive ones, and would rather watch other individuals than participate in their activities. This reaction is adjustive, for a person who will not try to make social adjustments cannot experience painful failures. The withdrawing adjustment is tried by almost all persons who encounter social thwarting, and frequently alternates with the more aggressive adjustments. A socially maladjusted individual is typically shy and retiring at one time, and aggressively compensatory at another, with seeming inconsistency.

Excessive seclusiveness is usually caused by a strong conditioned fear of social situations, or else by the persistent frustration of more active attempts to adjust to them. Many timid children have histories of harsh treatment from parents, or of demands made upon them that were far beyond their capacity to fulfill. If compensatory adjustments are suppressed by severe discipline, the child has no alternative except to withdraw. This is one of the dangers of a repressive type of discipline that stamps out undesirable adjustments without providing other constructive means for the satisfaction of motives.

The withdrawing defenses are usually regarded as more perilous than the aggressive sorts. They are less likely to be detected and to receive constructive attention, since they represent quiet and orderly behavior that is not a nuisance to parents and teachers. They are also harder to modify, since the individual is less actively seeking

an adjustment. The most common serious mental disorder, dementia praecox, is also characterized by extreme withdrawing. While this may be due in some degree to physiological factors, patients suffering from dementia praecox often have a long history of prior seclusiveness.

Negativism.—Withdrawing that is very vigorous and strongly emotionally toned is called *negativism*. It is shown by stubbornness, rebellion, refusal, and a negative kind of response to any social suggestion. The concept of negativism has three applications. It is an almost normal form of behavior in young children, an inadequate adjustment in older children and adults, and a symptom found in some psychotic states. Very young children, especially from about two to three years of age, show spells of negativism rather frequently. Children of this age have limited means for asserting themselves but can gain their point and attract attention by unreasonable refusals. Negativism is related to temper tantrums and is a rage-like form of behavior. Under desirable conditions of habit formation this phase passes. If training circumstances are unfortunate, a negative attitude may persist into the adolescent or adult periods as an inadequate response to social frustration.

Some persons with serious mental disorders also show negativism, refusing to comply with routine, refusing to eat, or doing the opposite of whatever they are commanded to do. This has the same significance as childhood negativism, for it is a means of personal expression under conditions that limit the range of other assertive behavior.

Phantasy.—Phantasy, or daydreaming, is an adjustive mechanism that almost everyone uses to some extent. To imagine the attainment of satisfactions that are not obtained in real life is an easy and available form of adjustment. Since such a large proportion of people daydream, this outlet must be considered normal. In one questionnaire study of college students, 98 per cent admitted that they had daydreamed recently. The most common types of normal phantasy represent the most frequently thwarted of common ambitions. Daydreams of possessing physical strength or attractiveness, of having

money and possessions, of being successful vocationally, and of securing a desired partner of the opposite sex, are among the most common phantasies of young people.

An individual who is withdrawn and seclusive usually daydreams immoderately, since this is the one positive means of substitute adjustment that requires no social participation. Excessive daydreaming is not conducive to good adjustment, since a person will not try to make overt adjustments when his needs are satisfied imaginatively. Many fanciful delusions of the mentally disordered are very similar to normal daydreams, being in no way more unreal or wishful. An important difference is that the normal person recognizes his daydreams as not real, while the phantasies of the abnormal person may be accepted as facts.

HYSTERIA

Conversion Hysteria.—Among the psychoneuroses, one of the most common and yet one of the most severe disorders is hysteria. Hysteria is not a clearly defined single maladjustment, but rather is a name traditionally applied to a large group of conditions. These are related by one common characteristic found in the personalities of individuals who show hysterical symptoms. The hysteric is said to be *dissociated*, unintegrated, or lacking in unity of behavior. This is a difficult concept which will be made more clear by subsequent illustrations.

The most frequent form of hysteria is called *conversion hysteria*, the name having arisen from a now discarded theory that the individual "converted" his mental conflict into a physical symptom. This type of disorder simulates various evidences of physiological illness, such as paralyses, pains, or anaesthesias (loss of sensation). Untrained observers, and most of all the patient himself, believe that these symptoms are physiological, but there is conclusive evidence of their psychological origin. The symptoms are usually local ones and involve a limited part of the body such as a paralyzed leg, a sore throat, or numbness of the hand. They conform to the conception of hysteria as a disorder of dissociation. A man with a hysterically paralyzed arm, for example, quite literally "does not let his left hand know

what his right hand is doing." The paralyzed member is shut off or dissociated from his total adjustive reaction. In more severe classes of hysteria such as *somnambulisms*, *fugues*, and *multiple personality*, whole segments of experience are dissociated from the rest of the individual's thought and behavior.

A Case of Hysterical Paralysis.—(Case 9.)¹ Kate F., a very attractive young girl thirteen years of age, was admitted to a hospital suffering from a partial paralysis of the left leg, extreme nervousness, and marked loss of appetite. Several months before, while she was in school, her left leg suddenly "gave way," felt numb, and had a tingling sensation of "pins and needles." She was confined to bed at first, then used crutches for a time, but made a partial recovery during the summer months. Upon starting school again in the fall, the symptoms recurred and she was brought to the hospital. Careful medical examinations indicated that there was no disease or organic disorder of the nervous system to account for her condition.

In a series of interviews with a psychologist the history leading to her attack was brought to light. After much hesitation, she tearfully related the story of a triangle situation involving her parents. Three years previous, her mother and a roomer in the home fell in love and eloped. The father and sisters found her mother, and brought her back home. Then for many nights there were violent and abusive scenes, as the father upbraided the mother, and she in turn also accused him of infidelity. Kate reacted to these scenes with crying and praying, and felt that she had lost all faith in her beloved parents. Other quarrels followed for some time, but at last the parents assumed an outward calm for the sake of the children. Kate continued to brood over the situation, however, and began to avoid the company of other children. She often stayed in during recess at school rather than face the other girls. It is notable that the leg paralysis appeared just before a recess period. In a long series of talks over many months, the psychologist made the girl tell the story of her parents' conflict over and over again. Gradually, Kate came to accept it as a misfortune that was entirely in the past and no longer a source of fear. With the assimilation of the experience, her symptoms disappeared.

The Interpretation of Hysteria.—There are two things to explain in a case of “conversion hysteria.” One is the source of the disturbance or dissociation of personality, and the other is the origin of the particular symptoms shown. One common source of dissociation is the development of *inharmonious and conflicting reactions toward some situation*. This is illustrated clearly by the case of Kate F. In earlier life she had learned to love and idealize her parents; now she finds them unworthy. She continues to live with them and outwardly to respect them, but in an unanalyzed and deeply emotional manner she is disgusted, repulsed, and disillusioned. Thus she learns to divorce her overt behavior from her emotional attitudes, to think one thing and do another. This is the essence of dissociation, the development of an inconsistent and fragmentary response to a situation.

The particular symptoms of hysteria have value as defense mechanisms and are developed as partial, although inadequate, adjustments. For example, Kate wished to avoid social contacts with her schoolmates during the recess period and had already resorted to many excuses. The paralyzed leg provided a perfect reason for withdrawing from company, and so was adopted or “learned,” the dissociated personality permitting this irrational solution. The physical disability in most cases of hysteria is *suggested* by some real but temporary physical disorder. It is probable that in Kate’s case her leg “went asleep,” a common phenomenon due to pressure that almost everyone experiences from time to time. Most persons take the leg “asleep” calmly, and stamp or move it until it is restored. The hysteric, however, both fears the worst and is ready to believe that the leg is really paralyzed. Also, the paralysis serves an adjustive end, so it is exaggerated and used as a defense mechanism.

The hysterical individual is entirely sincere in believing in his ailment. It is not a “pretended” or “imaginary” disability but a very real one, even though it arises from psychological causes. The individual is entirely unconscious of the source, nature, and utility of his symptom. He has hit upon it by blind trial and error, without realizing its significance. When the patient gains insight into the origin of the symptom and becomes reconciled or adjusted to the conflict that caused it, the disability usually disappears.

Other Cases of Hysteria.—Hysteria is a very common maladjustment, if the less striking cases are considered. Many a neglected housewife develops hysterical “sick headaches” that excuse her from irksome duties and elicit the sympathy of her husband and family. Hysterical vomiting is not infrequent in young children who can gain their ends by being ill. Vomiting seems very physiological, but it is only a reflex and can be conditioned to substitute stimuli. One of the commonest hysterical adjustments is the “nine o’clock headache” whereby a child may escape being sent to school, only to be quiet well again when it is too late to go.

The intense stresses of war precipitate a number of cases of conversion hysteria. An example is a young infantryman who developed a paralysis of the right arm after he had killed an enemy soldier.² He had been a conscientious and passive individual in civilian life with strong inhibitions against committing acts of aggression. His conflict was resolved by a symptom that kept him from again being a killer. Many “war neuroses” disappeared after the stresses of battle were over, and others were cured by psychiatric treatment. The conflicts and anxieties of some soldiers were so serious, however, that the symptoms persisted. About twenty per cent of veterans’ disabilities from World War II arose from psychoneurotic conditions. Disabilities that arise from industrial accidents or from automobile collisions are occasionally of hysterical nature, originating from the fear produced by the situation rather than primarily from physical injury. Since hysterical ailments can simulate almost all real illnesses, laymen cannot distinguish them reliably, and even general practicing physicians are often deceived. Experienced psychiatrists can detect most cases, either from the nature of the symptoms, the course of development, or the success of psychological treatment.

Somnambulisms and Fugues.—A more pronounced degree of dissociation than that of conversion hysteria is found in somnambulisms and fugues, which are more severe and less frequent forms of hysteria.

Somnambulism.—In somnambulism, which literally means “sleep-walking,” the individual goes into a trance-like state in which he re-

enacts some scene that had occurred in an emotional crisis. A classic example of somnambulism is Janet's case of Irene, a twenty-year-old French girl.³ (Case 10.) Irene's mother had died under most harrowing circumstances. For some time afterward, Irene would occasionally go into a trance-like condition in which she would re-enact with great manifestations of grief the scene at her mother's death, and her own subsequent attempted suicide that she had planned but had not carried out. During the somnambulism she was entirely oblivious of her surroundings, talking with her mother as if she were present, and ignoring anyone else. Between attacks, on the other hand, she showed no grief about her mother and went about her ordinary business normally. She had entirely dissociated her mother's death from the rest of her experience, reserving it for the hysterical episodes.

Fugue.—A *fugue* is a prolonged somnambulism during which a person forgets his identity, and often travels to a different place. After some time the individual usually "comes to himself," does not know where he is, and remembers his past life but not the period of the fugue. The fugue, therefore, is a temporal segment of his experience that is almost entirely dissociated from the rest of his life. The chief symptom of a fugue is termed *amnesia*, which means a loss of memory. This disorder is not especially rare, and cases of it are reported in the newspapers from time to time. The "amnesia victim" is found wandering in the streets and regains his former character gradually after he has been identified and restored to his family. A fugue is usually precipitated by an intense emotional crisis, toward which it has two adjustive functions. First, the individual spares himself from harrowing thoughts by forgetting all of his past; and second, his flight is a withdrawal from the stimuli that stir up his emotion.

Multiple Personality.—The most extreme form of hysterical dissociation is found in *multiple personality*, a disorder that is an exaggerated, alternating, and long-continued fugue. One case citation will make this condition more clear than many paragraphs of description.

A Case of Multiple Personality.—(Case 11).⁴ Mrs. X had shown severe hysterical symptoms throughout childhood. She had fainting spells, somnambulistic episodes, and hysterical pains and paralyses. At times her arm would hurt, again she had a stiff leg, and on one occasion she could not walk for two months. She was in constant conflict with her father, who punished her severely. Largely to escape an unhappy home she married a young man who was disapproved by her parents. Her husband was exacting, however, and she soon was weighted down with the domestic responsibilities of a baby. It was to escape these burdens that the first secondary personality appeared.

The secondary personality, which the psychiatrist named "Susie," was a mischievous and irresponsible childlike character. At times Mrs. X was a normal mother, at other times for hours or days she was "Susie," neglecting her housework for play or for wandering about the streets. Her infant died of neglect during one of these periods. "Susie" was unknown to the normal Mrs. X (amnesia), but "Susie" wrote notes in which Mrs. X was referred to as "she." "Susie" never spoke and was almost entirely insensitive to pain. Later, this patient developed two other secondary personalities. One, called "Jack" was a masculine character into which she would pass occasionally. At one time she was "the Baby," acting for several weeks as if she were an infant about one year of age. It is interesting to note that this patient became quite normal several years later, partly through psychiatric treatment, and partly because of her removal to a remote mining town where her responsibilities and conflicts were minimized.

PHOBIAS AND COMPULSIONS

Phobias.—A phobia is an irrational and unaccountable fear of some definite situation. The stimuli that may evoke phobias in various persons are almost unlimited. One person fears the dark, another is thrown into a panic by crowds, while others fear animals, high places, small enclosed places, running water, eyes, and a host of other things. Phobias vary greatly in intensity, ranging from a mild uneasiness in the presence of the stimulus, to a severe and continued panic that disorganizes the individual's entire adjustive

conduct. The milder cases are very common, and instances of them can be found in almost every classroom group. Phobias, along with compulsions, obsessions, feelings of doubt and unreality, and some similar symptoms, are classified traditionally as *psychasthenia*, in the general group of the psychoneuroses.

A Case of Phobia.—(Case 12). One of the classical cases of phobia was reported by Dr. W. H. R. Rivers, a British psychiatrist.⁵ The patient was a young physician who had suffered throughout his life from an intense fear of enclosed places (a “claustrophobia”). He was in anguish when in a small room with the door closed, and was unable to attend the theater, since the exits seemed to be blocked by crowds of people. During the war he displayed a fear of dugouts and preferred to be in an open trench under fire. Only then did he realize that his fear was abnormal. It was unaccountable to him, and he could remember no experience that might have caused it.

Dr. Rivers instructed the young man in how to recall memories of his earlier life that might be related to the phobia. After a number of attempts he recalled a significant incident that had occurred when he was four years old. He had found a piece of junk and had taken it to a junk merchant. After finishing this transaction, he returned through a dark narrow passage only to find the door to the street shut. A dog in the passageway began to growl, and the child became terror stricken and frantic in his attempts to get out. He had not recalled the incident during the interval, but the phobia had resulted, and he had terror dreams of being confined. After the memory of the experience was restored and assimilated, the phobia and dreams disappeared.

The Origins of Phobias.—Some of the principal characteristics of phobias can be enumerated. First, phobias often originate in an intensely fearful experience in childhood. Many cases have been traced to such a source, while in other instances this origin may be suspected even when it cannot be proved definitely. Second, the critical experience is peculiarly forgotten in spite of its great influence on behavior. The memory for the incident is said to be “repressed.” Third, when the incident has been recalled by the aid of the psycholo-

gist's techniques, and when the individual has adjusted to it, the phobia disappears. Fourth, most sufferers from severe phobias show other maladjustments, frequently being subject to "nervousness," anxiety, stammering, bad dreams, and other symptoms. This was true of Rivers' case, although it was not cited in the brief description above.

The easiest thing to explain about a phobia is the source of the particular fear for a certain stimulus. It is a conditioned fear reaction, learned by association. If an individual fears dogs, or high places, or the dark, it is because a strong fear was provoked at the same time that the substitute stimulus occurred. This is true in most cases of simple phobia. In a few cases, however, a double learning process occurs so that the feared thing is a secondary rather than a primary conditioned stimulus. For example, a person may be conditioned to fear death and may transfer this to an apparent fear of the dark, because "death" and "darkness" have become associated in his thinking.

The most significant elements in a phobia, however, are not the conditioning experiences, but the underlying personality traits, and the fact of "repression." If a fear experience is remembered clearly, it is usually overcome in time. On the other hand, rather trivial conditionings have resulted in phobias if the original experience cannot be recalled. This significant phenomenon will be investigated later. Also, a person who is generally well adjusted rarely develops a serious phobia. Apparently, the same factors in the formation of habits of personality that cause repression and phobia are also responsible for other evidences of inadequate adjustment.

Compulsions and Obsessions.—A *compulsion* is a strong impulse to perform some irrational act, often repeatedly. Persons who suffer from compulsions realize that their behavior is absurd, yet they cannot curb the impulse. Compulsions often accompany phobias, and have a similar psychological significance. A young woman who had a fear that something was behind her, also displayed a compulsion to make a thorough inspection of the room from time to time, although she realized that there was no one present.⁶ The compulsion thus had an adjustive effect; it reduced the fear reaction of the

phobia. Other compulsions usually are either reductive of phobias, or else the substitute for a phobia. They resemble phobias in their histories and in the means by which they may be cured.

An *obsession* is a recurring thought that the individual cannot prevent, even though he knows it to be silly, meaningless, or useless. For example, one girl who had a phobia for eyes also was obsessed with the phrase "fear looking out of her eyes," which kept running through her thoughts. A man was obsessed with the number 13. He was always looking for this number, and even counted the letters in words and phrases to see if there were thirteen of them.⁷ This obsession was traced to a sexual conflict. In earlier life he had an affair with a superstitious young woman who was afraid of the number thirteen. He was very ashamed of this episode and had repressed a direct memory of it, but the obsession with "thirteen" acted as a substitute for his preoccupation, and as a distraction that kept him from recognizing the real source of his anxiety. Obsession has its counterpart in normal life, as do almost all abnormal symptoms. "A tune running in one's head" is a familiar obsession that happens to almost everyone.

Repression and Adjustment.—Repression is the most generally interesting psychological phenomenon found in phobias, compulsions, and obsessions. To ordinary common sense it is inconceivable that an experience that exerts so profound an influence on an individual's life could be "forgotten." There is ample evidence, however, that repression does occur. The case histories of persons who suffer from phobias offer clear indications of its presence. More fundamentally, a large number of experiments with normal people show that there is a general tendency to forget experiences that are fearful or shameful. If this occurs in the ordinary unpleasantnesses of normal life, it is even more likely to happen in the intense cases that result in abnormalities of behavior.

Repression is interpreted most satisfactorily as a form of *inhibitory adjustment*. There are many other examples of how people may adjust by *not doing* (inhibiting) some act that would have unpleasant results. A person may adjust to a social rebuff by withdrawing from company, that is, by inhibiting his normal tendency to seek compan-

ionship. People tend to avoid the places or situations in which shameful experiences have occurred. Similarly, an individual may adjust to a painful event in his past by inhibiting any recall of the affair. Recall is an act, a response to a stimulus, and is just as susceptible to inhibition as any muscular activity. There is evidence that repression is usually incomplete at first. Soon after a fearful or shameful act has happened, it can be recalled without great difficulty. With practice the individual becomes more adept at the task of "not remembering," and so finally can recall the experience only with the greatest difficulty. Repression is thus an inadequate or partial adjustment, achieved by inhibiting the recall of painful circumstances.

It is not hard to explain how a "forgotten" experience can continue to cause a phobia. It is the general rule in habit formation that a reaction may be retained long after an individual has forgotten the situation in which it was learned. We all know " $2 \times 2 = 4$," but how many can remember the occasion on which it was learned? This phenomenon is even more likely to occur in the case of phobias, since fear reactions are largely autonomic and are not easily controlled or inhibited, while the more cortical memory reactions are subject to inhibition more readily.

Repression causes a phobia to persist because it prevents the most available method of a re-education from being used. To cure a child's fear of a dog he should become accustomed to that dog by repeated friendly and fearless contacts. But if he fears a dog long dead and buried, re-education can only be achieved verbally, through talking about the former fear experience and making a new adjustment to it. For the individual to be educated to make a new adjustment to any stimulus, which is the essence of the cure of maladjustments, that stimulus must be present, either actually or in the substitute form of words and ideas. When the words or ideas are repressed re-education is rendered more difficult or even impossible. The reinstatement of the memory permits the individual to learn a new and more adjustive response to the source of his fear. This is why the recall of the casual experience of a phobia usually results in a cure.

A tendency to repress the recall of unpleasant experiences is a general characteristic of maladjusted persons. This unfortunate habit of personality is acquired in childhood through unsympathetic treat-

ment received from parents or other advisers. Children usually like to confess their fears and troubles. If they are often rebuffed, or if they have no one in whom to confide, some other adjustment has to be made. The habit of repressing is hit upon by some children, just as others learn to daydream, compensate, or rationalize. Since phobias occur chiefly in persons who have a habit of repression, these individuals often show other maladjustments. Intense phobias, therefore are found most often in persons who are "a bit queer" in other ways as well.

ANXIETY AND ITS EFFECTS

Residual Anxiety.—A person who is unable to achieve a solution of a conflict, either by direct means or by one of the substitute mechanisms, remains in a persistent emotional state. Anxiety, or emotional response to conflict, is the starting point of all maladjustments. Residual anxiety, unreduced by adjustment, is also the terminal point of the study of adjustments, since it is the condition of a person who has failed to adjust at all.

Persistent anxiety as a response to baffling difficulties usually results in three kinds of symptoms. First, the individual may show evidence of the *visceral* condition that accompanies all unreduced emotional reactions. In the early stages, this may include a quickened pulse, increased blood pressure, and other signs of the emergency state of emotion. But the heightened tonus is exhausting and later is likely to result in lowered blood pressure, fatigue, impaired digestion, and similar indications of depletion. Second, anxiety is accompanied by *motor* signs, including "jumpiness," irritability, and a tendency toward useless and repeated muscular movements. Third, there is usually *symbolic* activity, in the form of talking or thinking about distressing thoughts.

Unreduced anxiety may occur in all degrees. Almost all normal people experience it occasionally in the forms of *nervousness* and *worry*. In more pronounced forms, the effects of conflict may be seen in *anxiety states*, which are psychoneurotic in severity. Also in this general class are the *psychosomatic disorders* such as peptic ulcer, resulting from organic changes induced by chronic emotional tension.

Milder Forms of Anxiety.—Nervousness and worry are commonplace when they arise from adequate present situations. The student often feels “nervous” when waiting outside the dean’s office for a potential reprimand and is worried when unprepared for an examination. Persistent nervousness, however, is a habit of personality. A chronically nervous person often carries the stimuli for his conflict around with him, usually as a strong feeling of personal insecurity.

Nervousness.—Both temporary and chronic nervousness are often misunderstood. The best interpretation of nervousness regards it as a persistent anxiety, with the motor symptoms predominating. The nervous person cannot relax; he constantly engages in minor meaningless movements. He squirms in his chair, fusses, fidgets, and constantly moves about. He may be irritable, complaining, and quarrelsome. Small distractions such as monotonous noises annoy him excessively, and he is too much disturbed by sudden stimuli. Along with these motor symptoms, a nervous person usually shows some visceral ones such as “nervous indigestion” and ready fatigability, and some verbal signs of worry and indecision.

Organic factors may contribute to nervousness, but not in the way that is believed popularly. Nervousness is not due to “weak nerves,” a common conception that has no scientific basis. It is true, however, that some of the symptoms of nervousness can be caused or intensified by toxic conditions, chronic infections, or some glandular disturbances, especially an excessive secretion of the thyroid gland. In other instances, disease may be an *indirect* source of nervousness. If a person has a painful illness or if he fears that he may not recover, nervousness may arise as an emotional response to hopeless difficulties. In such cases the organic disorder is the thing that is feared, but the nervousness itself is primarily psychological.

Much nervousness has no organic basis but represents an anxiety reaction to an unsolved conflict. A person who is responding to a problem to which he cannot adjust has an excessive tendency to react. He is “all keyed up” to make a response but is inhibited because he cannot make any adequately adjustive response. An inhibited strong impulse tends to raise the general level of readiness to respond to

other stimuli. The person therefore "releases his readiness, so to speak, by means of the nervous symptoms. The motor agitation of a nervous person is a random response to his inner tensions. The irritable behavior shows that the person is readily aroused to fear, complaint or anger by petty stimuli that would be ignored except for his exaggerated responsiveness. The tendencies of a nervous man to jump when there is a noise and to be bothered by small distractions are further indications of the same condition.

Temporary or situational nervousness ordinarily disappears when the conflict is past. Chronic nervousness is often the aftermath of basic conflicts of insecurity established in childhood. Such cases are usually hard to relieve without prolonged and intensive treatment.

Worry.—Worry is the symbolic or verbal equivalent of nervousness. Just as the individual who cannot adjust to a difficulty is impelled to engage in useless motor activities, so also he is stimulated to think and talk about all sorts of distressing matters. Worry is persistent nonadjustive *thinking*, in which the worrier goes over his troubles again and again, unable to arrive at any constructive solution.

Repression is often an accompaniment of worry. If a person cannot admit to himself the real cause of his fear, he may displace the emotional reaction to all sorts of other situations. For example, a young man was prevented from adjusting to normal adolescent problems by his father, who dominated him and made all decisions for him. The youth repressed his aggression against his father, but showed widely generalized worries about his health, his studies, and his social relationships. When a worry is disproportionate to its apparent cause, some concealed reason may be suspected.

Ordinary worries usually are helped by talking about them with a person in whom one has confidence. This helps to overcome repression and to break up the nonadjustive circular reaction. Any active and constructive attempt to adjust will tend to reduce worry, even when it is not entirely successful, because it gives the worrier a sense of having done something about his difficulties. The basic cure of worry and nervousness, of course, is the full readjustment of the person to the conflicts that have baffled him.

Psychoneurotic Anxiety.—Psychoneurotic anxiety states differ from milder nervousness and worry chiefly in the degree of their intensity. This distinction is an important one, however, as a severe anxiety state may be the most disabling of all the psychoneuroses.

Anxiety State.—(Case 13.)⁸ A young soldier had been anxious in civilian life, unable to tolerate quarrels or fighting. In the North African campaign of 1943, his tension mounted as he neared the front, but he kept himself under control. On the first day under actual fire he began to tremble, was nauseated, and wandered about not knowing what to do or where to go. On admission to a hospital, he had persistent tremor, was restless and extremely apprehensive. He continually watched the skies for aircraft. Sleep was disturbed by dreams of being in the battle. After a few weeks of treatment, he improved enough to be assigned to noncombat duty.

In this case, the acute anxiety state was precipitated by a minimum exposure to real danger, in a young man who already had severe conflicts relative to aggression. Other soldiers with more favorable early backgrounds sometimes developed very similar conditions of anxiety after much more severe situational stress, as in the instance of a fairly stable young soldier who had a most harrowing experience, covering himself with the bodies of his dead comrades to escape injury from shell fire.

In civilian life, acute anxiety states show a similar symptom picture, with great apprehension, trembling, and visceral disturbances. It usually follows some traumatic event or conflict, with which the personal resources of the individual are unable to cope.

Psychosomatic Disorders.—In recent years increasing attention has been given to the interrelationships between organic illness and psychological conflicts. Some disorders that are organic in their pathology but psychological in their origin have been called *psychosomatic*. These include some cases of peptic ulcer, colitis, essential hypertension (high blood pressure), urticaria (hives, a painful skin rash), and allergic reactions. Knowledge of these disorders is still incomplete. Some cases of peptic ulcer seem to be explained physiologically, for example, but other cases are better understood in psy-

chological terms, and it is often difficult to evaluate the relative effect of the two factors in specific patients.

Physiologically, peptic ulcers are caused by an assault on the tissues of the stomach by the acid digestive juices, and the failure of the tissues to be protected adequately by the normal mucous coating. In some but not all cases, the ulcers are associated with unresolved and little-expressed tension and conflict. Typically ulcers occur in busy, intensely motivated men who have repressed other outlets for their conflicts. Evidence shows that emotional responses can effect the circulation and the mucous tissues of the stomach lining. Psychological therapy for peptic ulcer patients has proved valuable to keep their ulcers from returning after they have been given medical treatment.

The study of psychosomatic disorders has given rise to a wider consideration of the relationships between physical and mental health. Anxiety and conflict have aggravating effects on many bodily diseases, while confidence helps in almost all curative processes. Physicians are recognizing that they must treat the whole patient as a human being and not just his illness.

MENTAL HYGIENE

The aim of mental hygiene is to prevent maladjustments and mental disorders. This aim is accomplished in two general ways, by treating minor disorders before they grow more serious, and by arranging the influences acting upon individuals so that they are made capable of solving their adjustive problems adequately. The treatment of incipient maladjustments and psychoneuroses is carried out chiefly by psychiatrists or psychologists, or by clinics in which these professions work together. This practice is a part of *clinical psychology*, and is described in Chapter XIV. On the other hand, the primary responsibility for preventive and positive mental hygiene lies with parents, teachers, employers, and people in general. Whenever one person has a contact with another, he may be a desirable or an unfortunate influence from the standpoint of mental hygiene.

Principles of Mental Hygiene.—The principles of mental hygiene arise from a knowledge of the nature and causes of malad-

justments. The chief thesis of the psychological approach is that abnormal behavior originates from inadequate adjustments to the thwarting of a person's motives. Since everyone meets with some frustrations, the person with better mental health is the one who can make good adjustments when difficulties occur. The ability to make good adjustments comes from the habits of adjustment that the individual has acquired through his past experiences. In a limited space, it is possible to state only what some of these desirable habits are. The methods by which such habits may be trained would require several volumes and touch the fields of child psychology, educational psychology, and psychiatry. A few of the most essential characteristics of mental health will be described.

Individual Factors in Mental Health.—The mentally healthful person has an *objective attitude* toward himself. He sees his problems rationally and is guided by facts and circumstances rather than by wishes and desires. Because of this objectivity, the ability to "sit back and take a look at himself," he can detect defensive behavior when it is incipient. The well-adjusted individual has *insight* into his own conduct. He has learned his typical ways of behaving not by "blind trial and error," but with some perception of the relationships between ends and means. Since he "knows himself," he can assimilate his shortcomings without having to compensate or rationalize. Another important characteristic of the well-adjusted person is that he has acquired *consistent reactions* toward his problems. He does not wish and fear the same thing, but has learned harmonious and unconflicting responses to the major factors in his life. A lack of consistency in reactions leads to dissociation, one of the basic factors in maladjustment.

Social Factors in Mental Health.—Many of the most significant criteria of good adjustment pertain to the individual's social relationships. First, the well-adjusted person engages in adequate and varied *social activities*. He does not keep too much to himself, or shun the ordinary amusements that are enjoyed by his group. Maladjustments thrive on solitude and are less often found in genuinely sociable persons. Moreover, good adjustment demands *social objectivity*, or

"fair-mindedness," the ability to see the other person's reasons, to understand his conduct, and hence to compromise more effectively. It is very important for every individual to have someone in whom to *confide*. Many maladjustments are made worse because an individual has no one with whom he can discuss matters that seem shameful or fearful. Consequently he worries alone, or else succeeds in repressing the unpleasant thoughts. A thorough talk about one's troubles, with a person in whom one has great confidence, will do much to relieve worry and to prevent repression.

Any individual who is able to guide his life by these principles of mental hygiene can scarcely develop maladjustments or psychoneuroses and will achieve good mental health.

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CHAPTER XI
ABNORMAL PSYCHOLOGY
THE MAJOR ABNORMALITIES

By LAURANCE F. SHAFFER, *Columbia University*

CHARACTERISTICS OF THE MAJOR ABNORMALITIES

The most serious mental disorders are the *psychoses*, which are so severe and so inclusive in their effects that the individual is unable to make the simplest adjustments demanded in everyday life. The psychoses are approximately equivalent to "insanity," but the latter term is a legal one and has no precise psychological definition. Most psychotic patients should be cared for in mental hospitals, although numerous cases are not in institutions.

Certain characteristic symptoms are common to the psychoses, and are found in disorders that arise from very different basic causes. These psychotic symptoms are not entirely unlike certain aspects of the behavior of normal people, but they differ strikingly in the degree of intensity with which they occur. For purposes of description, psychotic symptoms may be divided into two general classes. The first group includes the *inhibition of normal systems of behavior*, the things that the psychotic patient *does not do* that would be expected of normal people. The second group comprises the more positively *abnormal systems of behavior*. Not all of the symptoms described occur in all psychoses. Indeed, one psychosis is distinguished from another chiefly by the typical pattern of symptoms that each presents.

The Inhibition of Normal Systems of Behavior.—Many symptoms of the psychoses consist of the suspension of activities that are typical of normal persons. These are among the less spectacular characteristics, but are very important in identifying and understanding the grave mental disorders.

Disintegration.—A significant symptom common to many types of psychotic conditions may be termed *disintegration*. The disintegrated patient cannot relate his various experiences and thoughts

and cannot combine them into a consistent whole. Figuratively speaking, the reactions of such an individual have "fallen apart." He has lost the ability to perceive the connection between the real world of experience and his own desires, thoughts, and fancies. He does not discriminate, judge, or reason clearly. Especially significant is the failure of the function of self-criticism. The patient readily and uncritically accepts ideas that are out of keeping with circumstances and ordinary observation, and hence is susceptible to the development of delusions. He is prone to display emotion that is inappropriate to the present conditions, and to harbor beliefs that common sense would reject immediately.

A very pronounced degree of disintegration is *confusion*. In this state, the individual is bewildered, perplexed, and unable to perceive anything clearly. The introspective side of this condition is sometimes called *clouding of consciousness*, which means that the person has only a vague and chaotic awareness of external events.

Apathy and Withdrawal.—Another striking symptom is the tendency of many psychotic persons to withdraw from social contacts. This seems to be caused by a great *apathy*, an utter indifference, to persons and events in the environment. When such a patient is asked how he feels, the typical reply is "all right," and when asked how he likes the hospital, "it's all right." These answers are spoken with little trace of feeling, and it is evident that the patient does not care what happens to him, to others, or to the world in general.

Very apathetic patients are *inaccessible* in various degrees, that is, they cannot hold dependable communication with other persons. Sometimes psychotics appear to shut out the impressions from the environment. They do not know what is said to them because they are paying no attention. In other cases, evidence indicates that the individual can understand, but that he is inhibited from answering. An apparently inaccessible patient of this type, in a clearer moment at a later time, may give a correct account of all that has happened in his presence.

A related symptom is *retardation*, or the slowing down of all responses. The individual moves slowly, talks slowly, and may remain silent for a long time before answering a simple question. With-

drawn patients also often show *stereotypy* of speech or of mannerisms. One mutters "never die, never die, never die" in a scarcely audible undertone from morning to night; another constantly paces in his room, three steps forward and three steps backward.

The extreme of withdrawing is found in the symptom of *cataplexy* or *catatonic stupor*. Patients showing this symptom are often bedridden and completely helpless. They hold themselves in one posture for long periods of time, are mute, and sometimes do not even make the effort to eat. In less pronounced cases, the catatonic symptoms are displayed by great retardation, absence of voluntary activity, and a tendency to retain any posture in which the individual is placed. (See Case 1, on page 260.)

Dementia.—When used alone, the term *dementia* does not imply a type of disorder, but refers to a symptom found in some psychoses. Dementia means the deterioration of the intellectual behavior of the individual. As a psychosis progresses, many patients become progressively less competent mentally. Dementia is shown in two principal ways. First, the patient has difficulty in *remembering*; he forgets common information that he had learned in school or at his work. At the extreme he may not remember his name, the names of his parents or his children, and other things that are equally easy for normal persons to recall. Second, the demented person is usually incompetent in *learning* and in solving new problems. Even if his cooperation can be enlisted, he cannot learn skills that formerly he could have acquired with ease. True dementia is found chiefly in psychoses that involve organic changes of the brain, as in senile conditions and paresis. Recent research suggests that many other types of patients, formerly classed as mentally deteriorated, really suffer only from apathy and lack of motivation to cooperate.

Disorientation.—Many psychotic individuals are disoriented, which means that they do not know time, place, or person. An individual is said to be disoriented in time if he does not know the approximate date, and disoriented as to place if he does not know where he is. He is personally disoriented if he does not know who he is. In some cases disorientation is evidence of disintegration or confusion, while in other instances it may be caused by dementia.

Abnormal Systems of Behavior.—The most interesting symptoms of the psychoses are the definitely abnormal systems of behavior that are shown by psychotic patients, but not by normal people. These include hallucinations, delusions, and excessive variations in emotional tone.

Hallucinations.—A hallucination is a sensory perception in the absence of an appropriate external stimulus. A hallucinated individual reports that he sees things and persons, hears voices, or smells odors that are not actually present. Hallucinations may occur in all types of sensations. The simplest visual hallucinations consist of flashes of light or color. A little more complex are hallucinations of vague visual shapes that the patient interprets as snakes, ghosts, or unnamed beasts. Most visual hallucinations, however, concern actual objects and persons. One patient describes the pictures that he sees on the walls, where there really are none. Another sees a man and a woman following him around the hospital, and reports their appearance in considerable detail. Auditory hallucinations are probably the most common type. They range in complexity from a buzzing in the ears, through hearing a sound such as the constant ringing of church bells, to hearing human voices that scold, accuse, or curse the patient. Some patients carry on long conversations with the voices that they claim to hear. Hallucinations of touch are sometimes reported, as when a patient feels worms crawling on his skin. Another psychotic person reports that he constantly smells the odor of a skunk, which he believes to emanate from his own body. Hallucinations of sweet or bitter tastes also occur. Hallucinations are often related to the patient's delusions. An individual with delusions of persecution often reports that he sees his tormentors, and even more frequently that he hears their accusing voices.

Somewhat similar to hallucinations are the *illusions* sometimes seen by psychotics. These differ from hallucinations in having some external stimulus, which is misinterpreted. Thus a patient calls a strange physician by the name of an old friend and seems to recognize him as such. Or, an affected individual may hear voices in the sound of running water, which cease when the water is turned off.

Normal persons experience illusions too, but the illusions of the insane, like their hallucinations, are accepted as being real.

Delusions.—Delusions are abnormal, false beliefs that are cherished in spite of their manifest absurdity and in the face of contrary evidence. Delusions shade gradually into the “crank” opinions held by some apparently normal people. It is difficult to draw an exact line between the tenets of the parlor statesman who knows just how to save the country, and the overt delusions of the mentally disordered. The delusions of the psychotic vary greatly in consistency and elaboration. *Systematic delusions* may be detailed and apparently plausible, requiring careful checking to discover their falsity. At the opposite extreme, some delusions are very *unsystematized*, being transparently false, internally incoherent, and variable from time to time. Psychotic delusions may show any degree of systematization, from great to small.

(1) *Melancholy Delusions.*—Three chief kinds of delusions are usually distinguished, in terms of the general attitude accompanying the false belief. An individual with *melancholy delusions* believes that he is sinful, guilty, and cast out by the world, or that he suffers from some impossible organic loss. In this group, delusions of sin or of self-accusation are most common. The patient acknowledges that he has committed the “unpardonable sin,” or that he is responsible for all the misfortunes in the world. This delusion is accepted with humility, and the individual believes that he deserves any punishment that might be inflicted upon him. In other cases of melancholy delusions the individual asserts that he has no stomach, or that his legs are rotting away.

(2) *Delusions of Persecution.*—A second general type of false belief is the *delusion of persecution*, which has some similarity to the melancholy delusions, except that the individual blames his state on the conspiracy of other persons. The patient often gives an elaborate account of a great plot to poison him, to keep him in confinement, or to kill him. Prominent public figures or well-known societies frequently are accused of directing the persecution, and patients sometimes have detailed plans to defend themselves from

the oppression. In recent times, many patients have harbored delusions that electric power companies or radio stations are maliciously sending shocks through their bodies. Many years ago the devil was most often accused of torturing the deluded; now it is the radio. Thus delusions keep pace with scientific progress.

(3) *Delusions of Grandeur*.—The third general class consists of *delusions of grandeur*. The patient in this condition believes that he has great wealth or power, or that he is some great person. Most grandiose delusions are less well systematized and less plausible than are typical persecutory delusions. An occasional patient consistently will act out the part that he is a king in exile, or a great inventor who has been robbed, but most delusions of grandeur are shallow, changeable, and not well integrated. They are more likely to occur in the later stages of a disorder after some dementia has set in.

There is some relationship between the three chief classes of delusions, and a succession of delusions is often found in the same patient, first melancholy, then persecutory, and finally grandiose. This sequence has a psychological significance. First, the patient feels very distressed and develops melancholy beliefs. Then to explain why he is so miserable, he blames his apparent misfortune on others, developing delusions of persecution. This is very similar to the "rationalization" process found in normal people. Finally, to explain why he should be singled out for persecution, the delusions of grandeur appear.

Excessive Emotional Changes.—One large class of psychosis is characterized by extreme emotional reactions which may be either positive or negative. Severe *depression* is a term that explains itself. The individual seems to suffer greatly, his outlook is very pessimistic, and he is in the depths of despair. This condition is usually accompanied by a slowing down of all reactions. Often the depressed patient attempts suicide, since life holds nothing for him. Morbid depression differs from the despondency that might be shown by a normal person in having no logical cause sufficient for the response shown. As in the case of all other symptoms, depression may exist in various degrees, from small to great.

The opposite of depression is called *euphoria* ("good-feeling") or elation. The patient in this state is excessively happy without knowing why. He is optimistic and jocular, and nothing bothers or worries him. Laughing, loud talking, and heightened motor activity frequently accompany euphoria. Thinking is likely to be very quick but superficial, resulting in *flight of ideas*. A state of euphoria and overactivity together is called an excited or *manic* condition, which may exist in any degree.

Another emotional excess found occasionally in psychotic persons is *morbid anger* or irritability. A patient may be quarrelsome or irascible persistently, or he may show great outbursts of furor for short periods of time, often unprovoked by any sufficient external circumstance. These are accompanied with a great show of muscular activity and strength. Patients in extreme manic excitement or morbid anger satisfy the popular conception of a "madman." It should be noted that few psychotics have these spectacular outbursts. The great majority of patients are quite tractable, and offer few difficulties of control.

THE CLASSIFICATION OF THE PSYCHOSES

For a number of years it has been customary to classify severe mental disorders into two large groups, the *organic psychoses* and the *functional psychoses*. The organic disorders have fairly well-known physiological causes, including conditions due to old age, hardening of the arteries of the brain, syphilis of the nervous system, alcoholism, brain injury, epilepsy, and a large number of other organic factors each of which contributes relatively few cases. The so-called functional psychoses were believed at one time to be entirely psychological in origin. Although this conception is being broken down, the group still presents a useful classification for descriptive purposes. It consists of schizophrenia (*dementia praecox*), manic-depressive psychosis, and paranoia. In spite of the classification of the two groups, it is incorrect to suppose that the neurophysiological approach is applicable only to the organic psychoses, and the psychological point of view pertinent solely to the functional disorders. There are organic factors in both classes, but these are more definitely known for

the "organic" group. Psychological causes also play a part in determining the symptoms of both categories.

The various psychoses are not equally common, for more cases exist of some than of others. An approximate tabulation of the "first admissions" to mental hospitals during 1945 may be of some service in giving the picture of the relative frequency of the disorders.¹

<i>Organic group</i> (total)	40%
Senile and arteriosclerotic	21%
Paresis	5%
Alcoholic	4%
Other organic conditions	10%
<i>Functional group</i> (total)	46%
Schizophrenia	22%
Manic-depressive	9%
Paranoia	2%
Other functional conditions	13%
<i>Without psychosis</i>	14%
<i>Total</i>	100%

The "other functional conditions" of the table refer chiefly to severe psychoneuroses of the kinds described in the preceding chapter. Of the mental hospital patients "without psychosis," the largest single group are alcohol and drug addicts who, while not yet mentally disordered, are receiving treatment in such an institution.

ORGANIC PSYCHOSES

Senile and Arteriosclerotic Psychoses.—In old age, malnutrition of the brain frequently causes changes in conduct, and especially an impairment of the intellectual functions. In many cases this is complicated by arteriosclerosis (artery-hardening) of the brain.

Senile Dementia.—Unmixed senile dementia present a simple picture that is just what the name implies, a deterioration of intellect in old age. In a number of very elderly persons the sense organs, skin, glands, and hair show the changes characteristic of senility. The brain undergoes the same type of degeneration also. It loses weight, the convolutions become shrunken, and many nerve cells degenerate. The mental symptoms develop gradually. The usual first signs are failures of immediate memory. The senile individual cannot

remember persons recently met, although he may still recall childhood events in great detail. In a further stage of dementia, even long-learned things may be lost, and the individual is unable to tell his name, his age, or his former occupation. The deterioration of memory may be irregular in some instances. For example, one old patient was not sure of his own name, but could remember the names of two teachers with whom he studied as a child. Senile dementers often die of concurrent diseases such as pneumonia, or else lapse into unconsciousness and succumb quietly to sheer old age. None recover.

While many senile dementers are contented and cheerful, others show behavior that makes them hard to live with. Some become irritable, selfish, and quarrelsome, which probably are reactions to their inability to do things for themselves. Occasional delusions occur, in which the patient may believe that his family is trying to poison him or to defraud him. These delusions usually develop in persons who have been suspicious and distrustful in earlier years. The disintegration of senility releases and intensifies the habits of distorted thinking that have been formed during an entire lifetime.

Senile dementia rarely is found in persons younger than sixty years. One study found the average age of onset to be 74. Some persons are senile at sixty while others live quite unaffected into the nineties. This variation is due to the same factors that determine physical old age, such as constitution, diseases, nutrition, and the nature of the individual's life work. There is some evidence that alcoholism and certain infectious diseases hasten senility.

Cerebral Arteriosclerosis.—The hardening of the arteries of the brain progresses with the hardening of other arteries and is often found in old age. This seriously affects the nutrition of the brain and results in an intensification of the symptoms of senile dementia. High blood pressure together with hardened arteries may result in the bursting of cerebral blood vessels, which causes local damage to the brain. A sudden rupture of a cerebral blood vessel is *apoplexy*, commonly called "a stroke." The individual is unconscious for a time, and subsequently has a motor impairment such as a paralysis of one side of the body. Apoplexy is frequently associated with senile dementia.

Alcoholic Psychoses.—Excessive indulgence in alcohol causes several types of mental disorder.

Intoxication.—Common drunkenness is itself a psychosis although fortunately a temporary one. The mildly intoxicated person becomes genial and happy (euphoria), and shows some excitement and flight of ideas. With more alcohol he may display an irrational exaggeration of his normal personality trends, becoming loud, aggressive, suspicious, boastful, or sad. Normal inhibitions of conduct are weakened, the individual remembers poorly, and finally lapses into a stupor. This condition would be regarded as a serious mental disorder except for the speed with which persons recover from it.

Intoxication often functions as a defense mechanism against an individual's maladjustments. When under the influence of alcohol, a person forgets his troubles and escapes from an awareness of his conflicts and frustrations. This explains many persistent tendencies toward alcoholism. A permanent cure of alcoholic excesses seldom is achieved by physiological measures alone. It is necessary also to treat the psychological maladjustments that made the man take to drink.

Drunkenness is a not infrequent expression of an already existing mental disorder of some other type. If a mental patient has been drinking when his symptoms develop, it does not always mean that his psychosis is of alcoholic origin. Instead, the alcohol may be only an incidental or contributing factor.

Chronic Alcoholism.—Continued alcoholism causes changes in the nervous system as well as in other organs of the body. The behavior symptoms include tremors, loss of memory, and some degree of dementia. The chronic alcoholic has a poverty of ideas, his judgment is poor, and he does not reason clearly. Emotionally, he is likely to be indifferent to the opinions and feelings of others, but irritable and impulsive when his own acts meet with interference.

Delusions sometimes develop in deteriorated chronic alcoholics, just as they do in other persons whose rational appreciation of reality has been impaired from any cause. Delusions of self-accusation and of unworthiness are common, the origin of which is apparent. Other

frequent delusions are that the patient's wife is unfaithful to him or that his family are persecuting him. These seem to arise from "projection." Feeling that he is unfaithful to his family, the alcoholic defends himself by believing instead that they are unfaithful to him.

Since alcoholic dementia is due to an organic deterioration of the brain cells, the outcome is unfavorable. Treatment can check the disorder from developing further, but cannot restore what has been lost.

Acute Alcoholic Psychoses.—A chronic alcoholic may have acute psychotic episodes, precipitated either by an intense or prolonged spree or by some accident or illness that lowers his vitality. There are several varieties of these outbursts. One of the best known is *delirium tremens*, a very acute condition of short duration. The most prominent mental symptoms are an extremely fearful and agitated emotional tone, and visual hallucinations of a terrifying nature. Fantastic animals such as snakes, rats, and lions are often seen, or else hideous leering faces. These hallucinations are sometimes accompanied by delusions of persecution. The patient trembles, is restless and excited, and cannot sleep. After a course of three to ten days, the outcome of delirium tremens is either recovery or death.

A slightly different acute condition is *alcoholic hallucinosis*. The hallucinations are characteristically auditory and consist of accusing, threatening, or insulting voices. There is less clouding of consciousness than in delirium tremens, but the duration of the disorder is longer. It occurs only in chronic alcoholics. A particularly interesting disorder, *Korsakow's psychosis*, is usually associated with alcoholism, although it arises fundamentally from another cause. Recent studies indicate that it is due to a deficiency of vitamin B, which chronic alcoholics often have because they neglect their normal diets. In addition to agitation and anxiety, the patient has a striking loss of memory. To fill the gaps that he cannot remember, he "romances" about supposed experiences. A patient who has been in a hospital for days, for example, will give an account of a play that he saw on the preceding evening, or of a conversation that he had with friends.

Other Drug Psychoses.—Prolonged addiction to morphine, heroin, hashish and other habit-forming drugs results in mental de-

terioration that may amount to a psychosis. The withdrawal of the drug produces acute symptoms of anxiety, agitation, prostration, and sometimes delusions and hallucinations.

Paresis.—Paresis, which is also known by the names of “general paralysis of the insane” and “dementia paralytica,” is the principal psychosis caused by syphilis. Its diagnosis depends upon physiological evidence as well as on the development of the characteristic symptoms. A Wassermann test is made of the spinal fluid of the suspected patient which, if positive, indicates a syphilitic infection of the nervous system. Although all paresis is caused by syphilis, only about three per cent of syphilitic individuals develop this psychosis. To explain this fact theories have been advanced that paresis develops from a special strain of the syphilis germ, that it is precipitated by accidents, alcoholism, etc., or that persons vary in their susceptibility. The last theory has the most to commend it. For example, no case of paresis ever has been reported among the American Indians, although many of them have syphilis. A case of paresis has been cited (Case 8 on page 273 f.).

The Development of Paresis.—Paresis typically begins in middle life, ten to twenty years after the initial infection with syphilis, and has a long course of development. In the first or *preliminary* period the first changes noted are in mood, judgment, and character. Because of failing memory and judgment the individual may make blunders in business, sometimes losing much money. His moods are irregular, and he may be foolishly optimistic at one time and deeply depressed at another. Paretics in the early stage frequently show a loss of inhibitions, and engage in alcoholic and sexual excesses. Often these are regarded as character faults, and the nature of the disorder is not recognized. Disturbances of reflexes also occur at this time, but these are not detected unless the person is examined by a physician.

The second or *fully developed* phase of paresis develops gradually from the first stage. The symptoms are now unmistakably abnormal. The patient usually develops a stumbling, incoordinated manner of walking. His voice is thick because of an inability to control the muscles used in speech. Seizures or “fits” sometimes

occur. Mentally, he shows an increasing dementia and often is disoriented. At this stage several types of paresis may be classified. The simple demented type merely deteriorates. The "expansive" type develops unsystematized delusions of grandeur. Such a patient is happy, talkative, and tells silly stories of his great power, wealth, or virility. The "depressed" type has melancholy delusions, believing that his inner organs are wasting away or that he is being punished for sin. The expansive or grandiose delusions seem to be most frequent.

In the third or *terminal* stage of paresis, if effective treatment has not arrested the disorder, the patient is in constant tremor, emaciated, helpless, and paralyzed. His delusions disappear in utter dementia, and the termination is fatal.

The Treatment of Paresis.—The ordinary remedies for primary syphilis are ineffective for paresis, but as early as 1887 it was suggested that a prolonged fever would leave a paretic patient in an improved state. The fever treatment, which is now standard, is administered in two ways. The patient may be inoculated with malaria, a disease that produces fever and can be controlled. High-frequency electrical devices also may be used to raise the body temperature. With these treatments the disorder often can be arrested in the earlier stages and the symptoms lessened in severity. Many patients are improved enough to be discharged from hospitals, although complete cures are not common.

Juvenile Paresis.—Juvenile paresis develops in some children who have congenital syphilis. Its symptoms are motor incoordination, intellectual deterioration, and sometimes queer, impulsive behavior. It is not treated as successfully as adult paresis and is almost invariably fatal.

Epilepsy.—Epilepsy is not precisely a psychosis but is a serious disorder that probably has an organic basis. The typical sign of epilepsy is the fit or *seizure*, which is an episode having considerable uniformity from case to case. Before a seizure the epileptic has preliminary signs, which consist of flashes of light, subjective sounds, or moments of nausea. The seizure proper begins when the patient

becomes rigid, falls, and loses consciousness. After some seconds, convulsions begin as rhythmic contractions and relaxations of the muscles. Saliva foam is whipped up by the movements of the mouth, and the tongue may be bitten during the convulsive jaw movements. A typical seizure lasts a few minutes, after which the patient remains unconscious for a time, although relaxed. Following a seizure, the individual is usually fatigued and depressed.

Epileptic seizures have a great range of intensity and frequency. In mild forms the seizure may appear only as a shudder and a momentary lapse of consciousness. The number of seizures may vary from a few in a lifetime to several in a day. Extreme conditions of "epileptic insanity" show delirium, confusion, and great excitement. This state develops in some epileptics, who may then become patients in mental hospitals.

The organic basis of epilepsy has been clarified in recent years by the use of the *electroencephalogram* (EEG), which records the variations of electrical activity of the brain, popularly called "brain waves." The EEG's of epileptics are distinct from those of normal people, and help in diagnosing the type of epilepsy, the severity of the disorder, and, in some cases, the focal location in the brain from which the disturbance starts. The causes of this abnormal electrical activity of the brain are not known with certainty. Heredity, brain injuries at birth, and other brain damages and tumors have been blamed. Probably epilepsy has no one cause, but several that lead to approximately the same end result. There is no single cure for epilepsy, but selected cases have been helped by brain surgery, by drugs, and by diet.

THE "FUNCTIONAL" PSYCHOSES

Manic-Depressive Psychosis.—Manic-depressive psychosis has been called the disorder of emotional extremes. The affected person is either in the *manic* or excited condition or else is *depressed* and retarded. Up to about fifty years ago these states were classed as two separate psychoses, but they have much in common. The first point of similarity is that both mania and depression affect the emotional tone and the activity level of the individual, although in op-

posite directions. Intellectual functions are not disturbed seriously in either condition, and little or no permanent dementia results. The second reason for group the two together is that they often occur in the same person. An individual may show a deep depression at one time, and then, perhaps a year or two later, have an attack of a maniacal type. This characteristic alternation may take a number of forms. Several attacks of mania or of depression may be separated by intervals of normality. Or, a patient may change from a depressed to a manic condition or vice versa without any appreciable period of normality between. Many individuals, however, have only one attack of one form, without subsequent recurrences. Manic-depressive psychosis is typical of middle life, the greatest number of first admissions to hospitals from this cause being in the decade from forty to fifty years. Recovery from a single attack is comparatively rapid, and about 65 per cent of cases recover within one year of the onset of the trouble. A case of manic-depressive psychosis has been described. (Case 4 on page 261.)

Manic State.—No one else in the world seems as happy as a mild case of mania. The individual is joyous, optimistic, and smiling. He is also accelerated in all activities, moves quickly, talks rapidly, and even thinks with more than ordinary speed. Irritability and anger are shown only if he is prevented from carrying out his wishes. The individual's attention is flighty, however, and he talks and acts at random, thereby easily betraying his abnormality. In "acute mania" these symptoms are exaggerated. A patient in this condition moves constantly, shouts, sings, and may be very destructive of clothing and furniture. Since he sleeps little, an acute case of mania may wear himself out physically from the continued exertion. The patient may be disoriented and confused temporarily, but often shows a surprising degree of insight into his condition. Delusions of persecution or grandeur of a fleeting sort are sometimes seen, but they are not common among patients of this class.

Depressed State.—The depressive psychosis is the opposite of the manic condition in all essentials. The individual is grief-stricken, sad, and depressed. Retardation of speech and movement is also

typical. The patient talks in a low, plaintive voice, and very slowly. Often some time will elapse before a question will be answered. Most mildly depressed patients are oriented and understand that they are not normal. The greatest danger to depressed persons is that of suicide. Many are committed to hospitals after having threatened or attempted to kill themselves, and it is suspected that a large number of actual suicides are motivated by this condition. Some depressed patients have delusions of sin and unworthiness or of incurable disease, but the majority are not deluded.

Theories of Manic-Depressive Psychosis.—The causes of manic-depressive psychosis have so far escaped detection. Numerous physiological theories have been offered to account for the disorder, but almost all crucial experiments have been negative. It has not been established reliably that metabolism, glandular disorders, or anatomical changes of the brain are associated with the manic or depressive states. It is still possible that the psychosis is due to toxic or other physiological conditions that we do not have sufficiently delicate tests to discover, but this is a conjecture.

The psychological theories rest upon the observation that manic-depressive patients usually show a certain "type" of personality before the critical attack, and that normal persons also vary with respect to this trait. The *cyclothymic* personality is subject to ups and downs of mood, is unstable in emotional reactions, and tends to be too elated by success and too depressed by difficulties. A "cyclothymic" person has not learned how to compromise, but sees all situations either as entirely good or entirely bad. This trait may be the result of certain processes of habit formation in infancy and childhood, which later serve as a predisposition toward the psychosis.

Neither the physiological nor the psychological theories of manic-depressive psychosis are very satisfactory, and it is hoped that future research will reveal a more adequate explanation.

Involution Melancholia.—One variety of depressive psychosis that is sometimes classified apart from the manic-depressive group is *involution melancholia*. It occurs at the involution period or climacteric, the time of life at which the sex glands cease to function in

persons of either sex. The symptoms include irritability, depression, anxiety, delusions of sin or of persecution, and frequent attempts to commit suicide. The patient is more agitated than in simple depression.

This disorder illustrates clearly the interlocking of physiological and psychological factors. The glandular causes are apparent, and cases treated with gland extracts usually improve. But psychological factors contribute also. A woman in middle life sees that her children are grown and no longer require her care; a man sees the time ahead when he can no longer pursue his work. These are depressing situations, as are felt by almost all normal people who pass through them. It is not surprising, therefore, that the combined glandular and adjustive causes should coincide in some instances with enough severity to produce a psychosis.

Paranoid Conditions.—The nature of delusions, which are an important factor in many mental disorders, may be investigated most successfully in connection with the psychoses in which they are the chief symptom. Some years ago the term *paranoia* was applied to all disorders characterized by systematized delusions, but this diagnosis now is limited to the infrequent cases in which the delusions are the *only* consequential symptom. Pure cases of paranoia have systematic delusions, but show no dementia, disorientation, confusion, or excessive emotion. It is probable that most paranoids are not in mental hospitals, for the very reason that they are normal in everything except the delusion. Several varieties have been designated by special names. *Religious paranoia* consists of a belief that the individual is divinely inspired to found a new religious practice. Many religious paranoids attract followers and establish cults of more or less consequence. *Inventive paranoids* believe that they have made great discoveries, and *litigious paranoids* engage in endless lawsuits. Underlying these conditions in varying degrees are the fundamental delusions of persecution or of grandeur.

"True" paranoia is not as common as some similar psychotic states that are called *paranoid* (paranoia-like) conditions. Paranoid schizophrenia, the other symptoms of which are described in the next section, is quite prevalent. A case of this sort will be cited.

A Paranoid Case.—(Case 14.) Gregory E. was a college senior when he developed his delusions. He had always been a quiet, studious boy, although not of the highest intelligence. In spite of the fact that he was a good athlete, he had few friends, kept to himself, and was inclined to be suspicious of others. He excelled both in studies and athletics by his brother, to such an extent that his college career had been disappointing. Although previously in good health, he began to complain of feeling ill. Eventually he disclosed a belief that his illness was caused by poisoning. He thought that the men of the fraternities, of which he had not become a member, were poisoning his meals. They stood behind him in restaurants, he said, and made secret signs to the waiters to put poison in his food. To escape his tormentors he fled to a distant city, where his queer behavior attracted attention, resulting in his commitment. Later, in the mental hospital, he developed delusions of grandeur. He claimed that he was the greatest athlete of all time, and was imprisoned and poisoned because the fraternities would not permit such eminence to a nonfraternity man.

The Development of Delusions.—The development of Gregory's delusions offers an excellent opportunity to investigate the process psychologically. First, there is a long-standing *habit of distorted thinking* by which he is suspicious of other people, and blames them for his own shortcomings. This is an adjustment mechanism, hit upon by trial and error, and retained because it is satisfying. Thus he has been *learning to be a paranoid* for a long period of time. Second, the precipitating factor appears. He feels *ill*, just generally physically ill and miserable, and also somewhat *confused* in his thinking. There is reason to believe that this factor may be physiological. But why should he, who has been in robust health, feel ill? In keeping with his long-established habit of blaming others, the thought of poison occurs to him. Perhaps this idea is rejected at first, but it is such a satisfying explanation that he finally accepts it. This is aided by the growing state of confusion. The delusion of *persecution* is now formed. He retains enough rationality, however, to ponder on *why* he was persecuted. This is solved by the thought that

great people are always persecuted. If he were the greatest athlete of all time, people naturally would be jealous of him. This idea is pondered for weeks until the "if" becomes accepted as a fact, and the ideas of *grandeur* complete the delusional system.

Delusions, therefore, occur because they are adjustments. They permit the individual to reach an understanding that is personally satisfying to him. The same process operates in the formation of the unproved beliefs of normal people. The paranoid state is an exaggeration of the normal process, under conditions of disintegration.

Schizophrenia (Dementia Praecox).—The most prevalent of all psychoses is known by the alternative names of *schizophrenia* and *dementia praecox*, the former being preferred. These names refer to two important symptoms of the psychosis. Schizophrenia literally means "split-mind," a separation or disharmony among the various aspects of personality. Dementia praecox, "precocious deterioration," signifies the intellectual retardation that seems to appear in some cases. This dementia is "precocious" in that it occurs earlier in life, as distinguished from senile dementia. In fact, dementia praecox is a psychosis of youth. Although some cases occur at all ages from five to seventy, the greatest number have their onset in the decade from twenty to thirty.

Cases of schizophrenia have a number of common characteristics. The outstanding symptom is emotional *apathy*. The schizophrenic is indifferent to events that stir feeling in a normal person. He does not care about his friends, family, or business. He also neglects his person and is slovenly and dirty. Schizophrenics show the symptom of *disintegration* in striking degree. They laugh when there is no cause, but may show no emotion when there is a sufficient reason for it. Their reactions are quite divorced from the real world of experiences. *Delusions* and *hallucinations* occur in most instances.

Within the general frame of schizophrenia four special types are usually described. These have the common symptoms in varying degrees, and also other particular symptoms. Not all schizophrenic patients can be classified definitely in one of the four types, since there are intermediate and mixed cases.

Simple Schizophrenia.—A few cases of dementia praecox show apathy, indifference, deterioration, and no other striking symptoms. These constitute the “simple” form of the disorder. The onset is usually gradual, and the changes may not be noticed until they have progressed far. Typically, an adolescent or young adult becomes indifferent, listless, and devoid of any ambition. He may do more and more poorly at school or work until finally he does not bother to try at all. He sits at home and shuns the company of other persons. There is some indication that the idle time is filled with pleasant day-dreams. Emotional delapidation and intellectual dementia may appear later. Only a few of the hospitalized cases are classed as “simple” schizophrenia, but these statistics are unreliable, as many such persons may be cared for at home, while others may become tramps and vagrants.

Hebephrenic Schizophrenia.—The word *hebephrenic* means “child-minded,” but this term does not give an accurate description of the type that it names. The hebephrenic classification is the broadest among the types of schizophrenia and a considerable variety of patients are so designated. The classical hebephrenic type is distinguished by a more *sudden onset* than the others, and by *greater disintegration*. The chief characteristics are *silliness* of attitude and *incoherence* of speech and behavior. *Hallucinations* are common, but delusions are shallow and changeable. A case of this type will be cited.

(Case 15.) Helene W., nineteen years old, finished the ninth grade two years ago after an undistinguished school career, and henceforth remained at home. The first symptoms were noticed about six months ago. She would quarrel with her mother, and then go to stay with a married sister. After a few days she would become angry with the sister and return home again. Gradually her family noticed a foolish trend in her conversation. On several occasions she screamed in the night, saying that a man was under her bed. At other times she acted as though she were being chased by someone, which may be evidence of hallucinations. Finally she took to crying and jabbering constantly, and threatened to kill her father and herself. She was then committed to a mental hospital. Examination at the hospital

showed that she was completely disoriented. She gave irrelevant answers to questions about school subjects and common information. She has a few scattered delusions of being chased by men and calls the physicians by the names of former acquaintances. She is overactive and very destructive, tearing her clothing and disheveling the furniture in her room. She lies on the floor and rolls over and over, striking herself lightly with her hand while doing so. Frequently she laughs for minutes, but at other times she screams or cries. She makes foolish grimaces and mannerisms, and it is impossible to carry on a connected conversation with her. This girl shows many of the typical symptoms of a newly developed case of "hebephrenic" dementia praecox.

Catatonic Schizophrenia.—The catatonic type has two varieties, catatonic stupor and the rather misnamed catatonic "excitement." The distinguishing feature is *stereotypy*, that is, the persistence either of a posture or of a type of movement. The onset is like other classes of dementia praecox but is often more gradual, requiring several years to develop fully. A rather typical case of catatonic stupor follows. Another case has been described before. (Case 1 on page 260.)

(Case 16.) Daniel E., a well-educated young man, developed a psychosis at the age of thirty-one. For ten years before this time he had been increasingly "nervous" and "absent-minded." He would start for a visit and then forget his destination. At times he mistook strangers for acquaintances, and often seemed unable to understand what was said to him. A few weeks before commitment he left his job, became despondent, and showed an almost complete lapse of memory. He had no sense of responsibility but depended entirely on his wife and others to tell him every little act that he should perform. He bought poison, but never actually attempted suicide. He had no delusions, although he once said without any evidence of emotion that his mother-in-law was poisoning him. In the hospital he took no interest in his surroundings, stayed in bed most of the time, did not attend to his personal needs, and had to be aroused for his meals. He varied greatly from day to day, however, and on one occasion talked enough to demonstrate a good memory for past and recent

events. Gradually he became worse. He did not speak for several months, but sat bent over in a chair looking at the floor for hours at a time. He showed "waxy flexibility," retaining for a long period any posture in which he was placed. About one year after admission he was given the metrazol treatment, which is described in the next section. He grew more lucid, answered questions, said that he felt better, and appeared almost normal at times. His behavior, however, was still apathetic and lacking in interest. Characteristically, he remembered many things that had happened while he was mute and apparently inaccessible.

So-called catatonic "excitement" sometimes alternates with the stuporous form. It is active in motor behavior, but devoid of emotion or feeling. A catatonic patient will sometimes throw articles of furniture about, attack other persons, or cry out loudly. More common than these extreme outbreaks are stereotyped movements. The individual will pace up and down for hours, or will execute repeatedly a fantastic series of gestures. Although active instead of stuporous, such patients are very withdrawn. Their behavior is automatic and not responsive to the environment, hence it is appropriate to include them in the catatonic group.

Paranoid Schizophrenia.—The delusional form of schizophrenia is the most common, and the least likely to recover under ordinary conditions of hospitalization. The symptoms include disintegration, apathy, and withdrawing, as well as the characteristic delusions. This condition has been described in the preceding section, with illustrative cases. (Case 14 on page 322, and Case 3 on page 260.)

Treatment of the "Functional" Psychoses.—Until recent years the means used in mental hospitals were better described as "care" rather than as "treatment." Patients were given rest, drugs when needed to quiet extreme agitation, warm and cold baths for calming and for stimulation, and occupational and social activities to encourage attention to reality. In spite of the superficial nature of this program, many patients recovered, a testimonial to the self-restorative powers of the human organism. The old methods

of care are still in use and are of recognized value, even though they are not fundamental treatments.

Intensive research on the treatment of mental disorders has produced a few triumphs, all in the sphere of the organic conditions. Among others, these discoveries have included the electrical fever-producing treatment for paresis, the treatment of alcoholic psychoses with vitamins, and more effective drugs for reducing the frequency of epileptic seizures.

Research on the functional psychoses has been a series of disappointments. From time to time, treatments have seemed to hold great promise when tried with small experimental groups of patients, but have yielded no more than chance success when tested more thoroughly. Among the will-o'-the-wisps of therapy have been the extraction of infected teeth, the removal of tonsils, and the administration of glandular extracts.

In recent years two new types of treatment have been tried widely, *shock therapy* and *prefrontal lobotomy*. These seem to be of some value, although the results have not confirmed the hopes of their early supporters.

Shock Therapy.—For many years it has been observed that psychotic patients sometimes make remarkable recovery after a serious illness or injury. Since 1937, several methods of inducing "shock" deliberately have been tried. One method is by giving overdoses of *insulin*, the drug that regulates sugar metabolism. The sugar deficiency induces unconsciousness and physiological shock evidenced by muscular twitchings, profuse perspiration or dry pallor, and sometimes convulsions. After several hours the patient is brought to consciousness by the administration of sugar. The treatment may be repeated 30 to 50 times. A similar method is an injection of the drug *metrazol* to cause immediate unconsciousness and an epileptic-like seizure lasting a few minutes. Ten to 20 such treatments may be given at the rate of 2 or 3 per week.

A newer method uses *electric shock* passed through the brain from electrodes on the scalp. Unconsciousness and convulsions ensue. The electric shock treatment is safer and easier to control than are the drug-induced seizures.

The early enthusiastic claims for shock therapy have now been tempered, but more modest positive claims are valid. Evidence shows that a larger proportion of schizophrenics recover under insulin shock therapy than would be expected by chance. Shock treatment is even more successful with depressions and involuntional cases, electric shock being preferred for these disorders.

There is no generally agreed theory as to how and why shock therapy works. Speculative physiological theories have suggested that it stimulates the autonomic nervous system, that it affects brain metabolism, or that it causes actual damage to brain tissue as does frontal lobotomy, to be described below. There are also psychological theories, holding that shock therapy frightens the patient out of his psychoses by the threat of death, or that it appeases his need for self-punishment. These are not well regarded by most authorities.

Frontal Lobotomy.—This very radical treatment involves a surgical operation on the brain. Through a small hole bored in each temple, a thin knife severs the nerve tracts that connect the prefrontal lobes with the thalamus. Immediately after the operation, the patient is confused and disoriented, but recovers from this phase in about a week. Lobotomy has been most successful in relieving acute depressions; some cures of schizophrenia have also been reported. After the operation, the patient may be freed of anxiety and bizarre behavior, but other changes in personality also take place. Operated persons have been described as superficial, indolent and tactless, with prompt but shallow emotional reactions. There is an evident loss in the sphere of personality. Intelligence, as measured by tests, seems not to be affected adversely.

The theory underlying the effects of prefrontal surgery has not been worked out satisfactorily. One hypothesis holds that by severing the connection between the thalamus and the frontal cortex, the individual is freed from the self-centered emotional preoccupation that dominated his behavior.

Psychotherapy.—Psychological treatment, or psychotherapy, is carried out by interviews. The patient talks about his conflicts, anxieties, and life experiences under the skillful guidance of a ther-

apist, so that he works out new attitudes toward himself and toward other people. Psychotherapy is discussed at greater length in the chapter on *Clinical Psychology* (Ch. XIV).

Psychotherapy has proved an essential method for the treatment of psychoneuroses. Used alone, it is seldom effective for any but the mildest cases of psychoses. Psychotherapy has proved to be a valuable adjunct to shock therapy. The shock treatment often renders a patient lucid, accessible, and able to talk about his troubles. Subsequent psychotherapy may help the patient to understand the sources of his abnormal behavior, and to make more effective future adjustments.

Concluding Orientation.—There is no satisfactory basis for a comprehensive understanding of the psychoses. The best tentative hypotheses view the “inhibition symptoms” of disintegration, apathy, disorientation, and the like as results of physiological processes that are as yet undiscovered. Some of the more positive symptoms of abnormality, including hallucinations and delusions, are adequately explained by psychological concepts, in that they serve the same functions as do the adjustment mechanisms of normal people. The psychoses, for some years to come, are likely to remain a challenging topic for medical and psychological research.

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CHAPTER XII

THE NATURE OF INDIVIDUAL DIFFERENCES

By ANNE ANASTASI, *Fordham University, New York*

Differential psychology in its broadest sense is concerned with differences in behavior between individuals and between groups. Its fundamental aim is similar to that of all psychology, namely, the understanding of behavior. Differential psychology approaches this problem through a comparative analysis of behavior under varying environmental and biological conditions. By relating the observed differences in behavior to other known concomitant phenomena, it may be possible to tease out the relative contributions of different factors to behavioral development. If we can determine why one person acts differently from another, we shall know what makes people react as they do.

SCOPE OF DIFFERENTIAL PSYCHOLOGY

Individual variation is a universal phenomenon throughout the organic scale. Superficial and inadequate observation often creates an impression of similarity and even identity among the members of a group while the differences pass unnoticed. "All cats look gray at night" but upon closer inspection each becomes an individual in his own right. Every psychological investigation in which more than one subject was employed has revealed wide individual differences.

From the lowest form of life to man, no two individuals react alike when presented with the same objective situation. Thus in experiments on conditioning,¹ the number of trials required to establish the conditioned reaction ranged from 79 to 284 in a group of 82 protozoa; from 34 to 1112 in a group of 14 crustacea; from 3 to 35 in a group of 59 fish; from 30 to 40 in a group of 13 pigeons; and from 3 to 17 in a group of 11 sheep. Equally wide differences

were observed in a series of learning projects² in which small samplings of guinea pigs, albino rats, common short-haired cats, and monkeys of two species were tested with the same type of problem box containing a series of steps of increasing difficulty. The range of trials required by each group to learn step I was as follows: 16 guinea pigs, 53 to 407; 24 albino rats, 30 to 453; 62 cats, 9 to 136; 17 rhesus monkeys, 19 to 310; 6 cebus monkeys, 42 to 327.

Within the human species, individual differences have long been recognized. Many of our basic social institutions, and in fact the patterns of societies themselves, are largely colored by the fact that individuals differ from each other. In our everyday activities, we are constantly adjusting ourselves to individual differences among our associates. Certain broad biological or cultural groupings, such as age, sex, racial, or national groupings, also play an important part in social interaction. Such group distinctions have frequently been made the basis of social institutions and attitudes, to the almost complete exclusion of any consideration of individuals. It is a further aim of differential psychology to inquire into the nature and origin of any behavioral differences which may exist among these major groups.

HEREDITY AND ENVIRONMENT

Basic Mechanisms.—The causes of individual variation are to be sought in the individual's heredity and in the environmental conditions to which he has been exposed. Every trait or reaction of the individual depends both on his heredity and on his environment. Traits and activities cannot be classified into those which are inherited and those which are acquired. The problem resolves itself into a determination of the relative contribution of hereditary and environmental factors in the development of the individual. To what extent can the development of any given characteristic be altered by the control of environmental influences, and to what extent is such modification limited by hereditary conditions? Individual variations found under similar hereditary conditions may be attributed to the operation of different environmental factors. Similarly, when the environments are sufficiently alike, any dissimilarity in behavior may be attributed to differing heredity.

The understanding of the mechanism of heredity has been greatly advanced by the concept of the *gene*. The individual begins life at conception with the union of one germ cell from each parent, the ovum of the female and the spermatozoon of the male. Each of these cells contains hundreds of thousands of very minute particles, called genes, grouped into chromosomes. A gene is the carrier of a "unit character," that is, a hereditary factor or influence which always operates as a unit or in an all-or-none fashion. These unit characters of the geneticists are not to be confused with psychological traits, but are of a much more elementary nature. Thus even such a relatively simple characteristic as eye color depends upon the combined influence of a very large number of separate genes. Such complex hereditary determination would of course produce varying degrees of a trait, even though the individual genes may be characterized only by presence or absence. It is obvious that any attempt to identify psychological characteristics, and especially such a manifold and ill-defined phenomenon as "intelligence," with unit characters is entirely inconsistent with the concepts and data of genetics.

The hereditary basis of *individual differences* is to be found in the almost unlimited variety of possible gene combinations, especially in the case of such a complex organism as man. It is not surprising that duplicate individuals are not produced by chance, when we consider, first, the extremely large number of genes; secondly, the variation in gene pattern among the individual germ cells of a single parent; and thirdly, the union of germ cells from two parents in the production of any one individual. The only exception to this individual diversity of gene constitution is that of *identical twins*, who develop from the union of a single ovum and spermatozoon. Such twins are always of the same sex and identical in appearance. *Fraternal twins*, on the other hand, do not reveal such close resemblance and may be either of the same or opposite sex. The hereditary similarity of fraternal twins is no greater than that of ordinary siblings,* since they result from the simultaneous development of two fertilized ova.

In popular thinking, heredity is often regarded as synonymous with resemblance to parents or immediate ancestors. This is shown

* "Siblings" is a general term employed to cover both brothers and sisters.

to be false by a consideration of the mechanism of inheritance. Parents transmit to their offspring genes which they in turn have received from their parents. Hence the individual inherits from all of his direct ancestors, and not from his parents only. Some characteristics which have not been manifested for many generations may suddenly appear because of a particular combination of genes,* and the result will be an individual very unlike his parents in some one respect. Instances of this sort are not uncommon in family histories.

Another popular misconception is that the influence of heredity ceases at birth and that of environment does not begin until after birth. Hereditary factors may influence the development of the individual throughout the life span and their manifestation may be delayed until a relatively late age. Similarly, environmental influences operate from the moment of conception and are not limited to any phase of the life cycle. Experimentally produced "monsters" furnish striking examples of the influence of prenatal environment.³ In experiments on fish eggs, "Siamese twin" fish have been artificially produced by inhibiting or retarding the rate of development through chemical agents, temperature changes, and radiation. In some cases, one twin is much smaller than the other and is deformed, the larger twin being perfectly normal. Two-headed monsters have been produced among tadpoles and several species of fish by the application of various chemical or mechanical stimuli. Conspicuous variations in the number and position of the eyes of minnows have likewise been induced. If the eggs of the minnow are allowed to develop in sea water to which has been added an excess of magnesium chloride, peculiar eye conditions will appear in a large majority of the embryos. Instead of the usual two eyes, many will develop a centrally placed "Cyclopean" eye; others may develop a single lateral eye to the right or left of the head, or two eyes which are abnormally close together. In the human, differences in the diet and nutrition, glandular secretions, and other conditions of the mother which alter the chemical constitution of the blood may exert a pronounced influence upon the development of the embryo.

* That is, the combination of two recessives, one from each parent.

A further source of confusion in discussions of heredity is to be found in the common habit of speaking about functions and activities as being inherited. Heredity can exert a direct control only over the development of *structures*. In so far as a given activity involves the presence of certain structures, such as vocal organs, hands, glands, or nervous system, the hereditary factors underlying the development of these structures will influence activity. Similarly, the nature and degree of development of organs will affect their functions. But this is only a *limiting condition* imposed upon the development of a given type of behavior. Hereditary factors may prevent the appearance of a function through the absence of the necessary structures, but the converse does not hold. Within the limits set by the individual's structural characteristics, there are almost infinite possibilities for varied behavioral development.

The concept of *environment* itself requires some clarification. The popular definition of environment is a geographical or residential one. A child is said to have a "poor environment," for example, because he lives in the slums. Or his "environment" may be described as a French village, an American small town, or a British mining community. To the psychologist, this is a very inadequate designation of environment. Psychologically, environment is to be regarded as the sum total of the *stimulation* which the individual receives from conception until death. It will be noted that this is an active concept of environment. The mere physical presence of objects does not constitute environment unless the objects serve as stimuli in the experience of the individual. The definition is also a more inclusive one, covering all forms of stimulation and extending over the entire life cycle.

Selective Breeding.—Since the famous experiments of Mendel, geneticists have made constant use of selective breeding to investigate the inheritance of structural characteristics. The application of this technique to the study of behavior characteristics, however, has only recently begun on a very limited scale. One such investigation⁴ was concerned with maze learning in white rats. An initial group of 142 rats were given 19 trials in running a maze, the number of "errors" (that is, entrances into blind alleys) being determined for each ani-

mal. On the basis of the total error scores, ranging from 7 to 214, the rats were separated into a "bright" and a "dull" group for experimental mating. Mating occurred only within each of these two groups. This procedure was followed through 22 successive generations, the "brightest" rats in each generation being selected in terms of maze performance and bred together, and the "dullest" being similarly selected and interbred.

The maze-learning distributions of the bright and dull groups gradually separated until there was virtually no overlapping between them in the seventh generation. Little or no further differentiation occurred beyond this generation. When groups of bright and dull rats were cross-bred, a distribution similar to that of the original parental group resulted, most of the animals now obtaining intermediate scores, with relatively few at the dull and bright extremes. Such an experiment demonstrates that hereditary factors play an important part in the maze performance of rats. Through what specific structural characteristics the hereditary influences operate is not, however, indicated. It cannot be concluded that there is a specific gene or combination of genes directly concerned with the transmission of any such characteristic as "maze-learning ability." A more plausible explanation is that hereditary factors influence a number of characteristics such as health, physical vigor, endocrine balance, intensity of the hunger drive, activity level, and the like, which in turn affect the maze learning of white rats.

Experimental Variation of Environmental Conditions.—

Numerous experiments have been performed to determine how far behavior development could be modified by controlling the activities of the organism. The procedure has been either to prevent the exercise of a given function or to provide additional stimulation or opportunities for practice in the function. For example, tadpoles have been kept in drugged water until the age at which complete swimming movements ordinarily appear.⁵ When such animals were transferred to fresh water, they began to swim normally as soon as the effects of the drug wore off, despite the lack of previous opportunity to practice this function. Such findings indicate that swim-

ming will occur in this type of animal when a certain stage of structural development has been reached, regardless of previous practice. By way of qualification, however, it should be added that the experimental animals tend to swim slower than a normally reared control group.⁶ Thus practice apparently causes some difference in the way in which the function is carried out.

Similar experiments have shown that sexual behavior, in its specific manifestations, depends to a considerable extent upon learning. When the animal reaches sexual maturity, some form of sexual behavior will generally occur as a result of physiological factors. But the particular way in which such activity is expressed and the object toward which it is directed may vary widely through environmental circumstances.⁷

An investigation in which a young chimpanzee was reared for a short period in a typically human environment throws further light upon the factors affecting behavioral development. The animal showed remarkable ability to develop typically human behavior in its feeding and sleeping habits, play and social behavior, response to language, reaction to clothing, and similar activities. The degree to which it proved possible to "humanize" the behavior of this ape is indeed suggestive, especially in view of the fact that the period of residence in the human environment was only 10 months and did not begin at birth but when the animal was 7½ months old.⁸

Experiments with human infants who have been artificially prevented from exercising such motor functions as standing, sitting, or reaching for objects show considerable retardation in the development of these functions in comparison with the norms. After only a short "unrestricted" period, however, the normal activities appear.⁹ A sort of natural experiment of this type is furnished by the cradling practices prevalent in certain cultures. Among the Hopi Indians, for example, the newborn child is bundled tightly in a blanket and then tied securely to a stiff board. For the first three months of life, the infant spends nearly all his time in such wrappings, which prevent motion of arms or legs or even turning of the body. Despite this extreme restriction of movement, Hopi children when released show the same sitting, creeping, and walking behavior and in the same

sequence as white American children. It is also interesting to note that no significant difference was found between the average age of walking of Hopi children cradled in the traditional manner and those who had been cradled in the manner of white children.¹⁰

Of special interest for the problem of heredity and environment are the experiments by the method of *co-twin control*. One member of each pair of identical twins is given intensive training in certain functions; the other serves as the control subject and is allowed to continue his normal everyday life without special training. In general, such studies have shown that the effects of specific environmental stimulation are either slight or temporary in the development of sensori-motor behavior in young children. For example, a pair of 46-week-old identical twin girls were examined in stair climbing and in behavior toward cubes, including ability to reach for and grasp cubes, manipulation, and constructive play. The trained twin (T) received 20 minutes of training daily for six weeks. At the end of this period, the control twin (C), with no specific training in either function, proved equal to the trained twin in her behavior with cubes. In stair climbing, T excelled, but this difference disappeared after C had received only two weeks of training. Thus because she was older (53 weeks) when she began the training, twin C was able to accomplish in two weeks what had required six weeks of training for T, who began when 46 weeks of age.¹¹ The sensory and motor development of the young infant is so intimately related to the structural growth of bones, muscles, receptors, and nervous system that it is not surprising to find the role of training minimized. We cannot, however, generalize from such results to the more complex intellectual and emotional characteristics of the older individual.

Children Reared in Isolation.—Several cases are on record of human children who were brought up either in isolation or in exclusive association with lower animals. The most famous case is probably that of the "Wild Boy of Aveyron." In September, 1799, three hunters came upon a boy of 11 or 12 in a French forest. The boy was completely naked, unkempt, scarred, unable to talk, and seemed to have been leading a wild, animal-like existence. He finally came

under the observation of the French physician, Itard, who subsequently published a detailed account of the case.¹² When found, the boy seems to have been markedly deficient in all forms of behavioral development, including sensory, motor, intellectual, and emotional.

After five years of ingenious, painstaking, and methodical training, Itard abandoned the task, having failed to bring the boy up to normal. This has led many to conclude that the Wild Boy of Aveyron must have been an imbecile from birth, who had been abandoned by his parents because of his mental deficiency. Such a conclusion, however, overlooks several important points. In the first place, marked improvements were effected by the training, even though a normal level was not attained. For example, although the boy could not learn to articulate sounds, he succeeded in learning simple written language, being able to reproduce written words from memory and to use them to express his wants, as well as to understand their use by others. Secondly, had the boy been feeble-minded because of a basic structurally imposed deficiency, he should probably have been unable to survive in the very trying circumstances of his primitive environment. Finally, the fact that the training was begun so late in life may furnish an adequate explanation of its lack of success. Subsequent educational efforts are inadequate to undo the effects of prolonged earlier nurture.

The more recently discovered "wolf children" of Midnapore, India, represent a similar case. These were two girls, aged about two to four and eight to nine, respectively, who were found living in a cave with wolves in a sparsely settled region in India and were subsequently adopted by a local missionary who attempted to train them.¹³ Mention should also be made of the celebrated case of Kaspar Hauser about whom so much has been written. Some accounts suggest that this boy was an heir to some princely house and was put out of the way by political enemies. He was apparently confined from early childhood in a dark cell not large enough for him to stand upright. When he awoke he was accustomed to find bread and water, but he never saw the person who brought them and had no knowledge of the existence of other human beings. He lived under these conditions up to the age of about 17, when he was released.¹⁴

In all of these cases, the child's behavior when first brought into a civilized human community was very unlike that of "normal" children. Sensory acuity, posture, locomotion, language, emotional expression, reactions to other human beings, and other forms of behavior which are generally regarded as more or less "fixed" by the individual's constitution were found to be markedly altered in these children. The implications of these observations were succinctly summarized by Stratton¹⁵ as follows:

"Lack of association with adults during a certain critical period of early childhood, it seems likely, produces in some or all normal children marks like those of congenital defect. The evidence seems against the romantic view that a civilized community is a chief obstacle to the development of personality. On the contrary, the higher forms of personality become possible only in and through such a community. By our biological endowment alone, or by this as developed by maturing and learning in an infrahuman environment, we remain man-beasts. We become human only by active intercourse in a society of those who already have become human."

Isolated Communities.—The study of children reared in relatively isolated communities, in which educational and cultural facilities are very limited, presents in a milder form the same situation encountered in the cases of the "wild children" described above. These investigations have ordinarily dealt with fairly large groups and have employed standardized tests and better controlled observations than the case studies reported in the preceding section. In one investigation conducted in England, the Stanford-Binet Intelligence Scale was administered to 76 canal-boat children and 82 gypsy children.¹⁶ Both groups had very limited schooling, the canal-boat children attending school on only about 5 per cent of the total number of school days, and the gypsy children on about 35 per cent. The home surroundings were also intellectually very inferior, the canal-boat children leading a more isolated existence, with fewer social contacts than the gypsy children.

In both groups, the results suggest the influence of schooling and home environment upon intelligence as measured by current tests. The average IQ of the canal-boat children was 69.6, that of

the gypsy children 74.5. This difference is in keeping with the better school attendance and greater opportunity for social contacts of the gypsy children. It will be noted that both group averages are well below the "normal" IQ of 100. Taken at face value, these averages would suggest at best a borderline group, with a few distinctly feeble-minded individuals. Further analysis, however, brings out the probable influence of the restricted educational facilities. Thus a marked tendency was found for the older children to obtain lower IQ's than the younger. The correlation between age and IQ was $-.755$ among the canal-boat children and $-.430$ among the gypsy children.

Such a finding is quite contrary to the data on growth of intelligence under ordinary conditions, which show that the IQ tends to remain fairly constant throughout life. The discrepancy may be explained in terms of specific environmental influence. The intellectual environment of the younger canal-boat or gypsy children is not so far below normal as that of their older brothers and sisters. The younger child in any home is exposed to relatively simple intellectual stimulation; as he grows older, differences in schooling and in the cultural level of the home become more apparent. This explanation is corroborated by a comparison of siblings *within the same family* in both the canal-boat and gypsy groups. Such a comparison revealed a fairly consistent drop in IQ from the youngest to the oldest children within each family, the IQ's of the youngest children falling within the normal range.

Similar results have been obtained in a number of studies on children living in isolated, backward mountain communities and rural districts in the United States.¹⁷ In such studies, scores on performance tests, which are less dependent upon schooling, tend to be higher than scores on the more highly verbal type of tests. All tests, however, show a consistent age decrement. Thus in one investigation, the average IQ on the Pintner-Paterson Performance Scale dropped from 91 at ages 6-8 to 75 at ages 14-16; in the Goodenough Draw-a-man test, it dropped from 80 to 49. In another study, the median IQ on the Myers Mental Measure dropped from 83.5 at age 7 to 60.6 at age 15.

Of special interest is a study in which intelligence tests were administered to over 3000 east Tennessee mountain children and the scores compared with those obtained by children in the same areas and largely from the same families, who had been similarly tested ten years earlier.¹⁸ During the intervening period, the economic, social, and educational status of these communities had improved considerably. Paralleling such environmental changes, the median IQ of the total sampling rose from 82 to 93, the increase being noted in all age and grade groups.

Family Resemblances.—It is a common belief that family resemblances in psychological traits are attributable entirely to heredity. The study of family likeness has traditionally been the hereditarian's favorite source of data. It is not uncommon to hear a child described as having his father's business acumen, his aunt's musical talent, "taking after" his grandfather in obstinacy, and perhaps inheriting a keen sense of humor from an Irish grandmother on his father's side! The successful son of an eminent family attributes his accomplishments to the fact that he is "well-born." A lecturer's vigor and zeal are explained by his coming from "pioneer stock." A boy's ingenuity with mechanical toys is regarded as being "only natural" when one finds that he is descended from a "long line" of boat builders and inventors.

Nor is this type of interpretation limited to popular and everyday discussions. Many otherwise accurate and well-conducted scientific investigations on family resemblances contain the same logical fallacy, that is, they ignore the fact that close relatives generally *live together*. The environment of individuals within a single home is certainly more similar than that of persons picked at random. Moreover, the closer the hereditary relationship, the greater the environmental proximity. Thus parents and children, and brothers and sisters usually live in the same home, whereas more distant relatives, such as uncles and nephews, or cousins, come into less frequent contact. Related individuals also constitute in part each other's environment and may be rendered more alike by this mutual interaction. Thus it appears that a hierarchy of family resemblances could be produced by environment alone, which would coincide with that actually observed.

The two major methods employed in the study of family resemblances and differences are *family history* and *correlation*. The former has been applied chiefly by eugenicists. Genealogies are traced and pedigree charts drawn up for families which are outstanding either for their talents or their deficiencies. This method was launched by Sir Francis Galton in his book on *Hereditary Genius*,¹⁹ in which he reported data on 997 eminent men in a total of 300 families. Similar studies subsequently conducted in different countries have all yielded essentially the same results.²⁰ All show that eminence tends to run in families. Similarly, the investigations on degenerate and feeble-minded families, the best known of which are probably the Jukes²¹ and the Kallikaks,²² show that such characteristics as mental deficiency, crime, and pauperism tend also to run in families. To argue from such results to heredity, however, is quite unjustifiable. The operation of environmental influences in each case is too obvious to overlook.

Investigations by the correlation method have revealed a hierarchy of family resemblances in mental-test performance.²³ Identical twins show the closest resemblance, the correlations between their scores often being in the neighborhood of .90. The next highest correlations are found between fraternal twins. Sibling correlations are lower, and parent-child correlations fall approximately within the same range as those between siblings. All of these correlations vary somewhat with the nature of the test and the age of the subjects. It is interesting to note that the correlation between fraternal twins is quite generally higher than that between siblings, although the hereditary similarity is no closer for the latter than for the former.

Special Family Relationships.—Investigations on foster children and on identical twins reared apart suggest the degree to which ordinary family resemblances may have resulted from environmental similarity. *Foster children* show a rise in IQ after adoption into a foster home, this rise being greater the younger the child and the higher the socio-economic level of the home. The resemblance between siblings living in different foster homes, furthermore, is much less than that ordinarily found between siblings in the same home. Thus in one group of 125 pairs of siblings, each adopted into a

different foster home and separated for a period of 4 to 13 years, the sibling correlation in Stanford-Binet IQ was only .25, in contrast to the correlation of about .50 usually found between siblings living in the same home.²⁴ There is some evidence, moreover, indicating that the IQ's of children reared in foster homes average higher than would be expected on the basis of their own parents' intelligence.²⁵

Some investigators²⁶ have emphasized the role of heredity in their interpretation of foster child data, although admitting that a favorable home environment may raise the IQ as much as 20 points and an unfavorable one depress it as much as 20 points.²⁷ A total possible effect of 40 points, suggested by such a conclusion, is certainly not negligible and might in some cases make the difference between feeble-mindedness and normal intellectual level. Moreover, since very unfavorable homes are generally disqualified as foster homes, the actual effect of home environment in the total population is probably underestimated in such foster home studies.

The study of *identical twins* who have been separated in infancy and reared apart in different foster homes yields data which are particularly crucial for the problem of heredity and environment. In one exhaustive search for identical twins who had been separated since early infancy, 19 pairs were located and studied.²⁸ The findings varied from one pair to another, but when the environments were sufficiently unlike, the twins revealed marked discrepancies in all traits, including intellectual, emotional, and even such physical characteristics as general health and bodily vigor. Naturally, when the twins were adopted into homes which offered closely similar intellectual and emotional stimulation, their behavioral development was also quite similar. Mere geographical disparity does not constitute a difference in psychological environment. As an illustration of the results obtained when the environmental difference was sufficiently large to yield clear-cut results, the following case study is reported:

Case IV: Female twins, separated at the age of 5 months and reared by relatives; 29 years old when examined. Mabel had led the life of an active farm woman on a prosperous farm. Mary had lived largely a sedentary life in a small town, clerking in a store during the day and teaching music at night. Mabel had only

an elementary school education in a rural school, while Mary had had a complete high school course in an excellent city school. At the time of examination, a vast difference was noted between the twins in intellectual, emotional, and physical traits. Physically, Mabel is described as robust, muscular, and in perfect health, while Mary was underweight, soft-muscled, and in poor general condition. Mabel weighed $138\frac{1}{2}$ lbs., Mary only $110\frac{3}{4}$ lbs. Intellectually, an equally striking difference was found, but in favor of Mary, whose Stanford-Binet IQ was 106 as compared with Mabel's IQ of 89. Even larger differences were observed in personality characteristics, the rural twin being described as more stolid and stable, giving fewer neurotic reactions, worrying about fewer things, and responding less emotionally than did the urban-bred twin.

TRAINING AND GROWTH

The Concept of "Mental Growth."—When the psychologist studies "mental growth," he compares the individual's performance at successive ages or, more often, he compares the performance of different individuals at each age level. The differences found in such an investigation may be properly designated age changes in mental traits. To call them "growth," however, is to make assumptions which extend far beyond the scope of the data. Attempts have been made, for example, to plot "growth curves" of mental traits, by analogy with the growth curves found in height, weight, bodily proportions as indicated by various indices, and the like. Such mental-growth curves show merely the performance of individuals at successive ages in some standard test situation.

Such a curve does not differ in any essential respect from a learning curve. In both cases the subject is tested under similar conditions at successive intervals and his progress is charted on the curve. Learning curves usually cover a shorter period of time than growth curves, although a learning experiment could conceivably extend over several years. The major difference between learning curves and growth curves, however, seems to be that in the former the subject is given special training under rigidly controlled experimental conditions, while in the latter he is left to his own resources. Thus it would seem that a mental-growth curve is at best a practice curve obtained in

the absence of controlled conditions. It reflects the cumulative effects of the random training and experience of everyday life, without adding anything essentially new to the picture. It also follows from this analysis that growth curves are specific to the cultural milieu in which they are obtained. If the learning conditions differ from one group to another, the curves of "mental growth" should likewise be expected to differ.

Age Changes in Mental Traits.—If we reformulate the question of mental growth in terms of operationally defined concepts, many of the scattered findings on this problem become more meaningful. Rather than discuss the growth of some vague, hypostatized intellectual function which exists over and above concrete behavior, we shall inquire into the specific age changes in behavior which occur within a given cultural milieu.

Performance on most of the common intelligence tests tends to improve until the late teens or early twenties.²⁹ This improvement, furthermore, continues longer among subjects in the higher educational levels. Thus high school and college students, for example, show a continued improvement beyond the age when such improvement ceases in individuals with only an elementary school education. Such results suggest the dependence of mental development upon schooling, as well as upon other experiential factors.

It has been frequently suggested that the curve of mental development is negatively accelerated, that is, progress is most rapid at the outset, the successive yearly increments becoming progressively smaller as the individual approaches maturity. This, however, is a difficult point to determine. In place of the more familiar negatively accelerated curve, a straight line or a positively accelerated curve may be obtained, depending upon such factors as the units in which the test scores are expressed, the difficulty of the test, and the age range and intellectual and educational level of the subjects. The question of the *form* of the mental-development curve is submerged in a tangle of technical controversy from which it is not yet possible to glean many clearly established facts.

A question of considerable practical interest concerns *adult intelligence* and the decline of intellectual functions.³⁰ On such tests as

the Army Alpha, Otis Self-Administering, and Wechsler-Bellevue, the average scores exhibit relatively minor drops in the decades of the twenties and thirties, the decline becoming progressively steeper with age. Several factors must be taken into account in interpreting these changes. In the first place, the age decrement is not found uniformly in all types of tests. For example, in tests of arithmetic reasoning, the decline is relatively slight; in vocabulary and in general information tests there is little or no age change or even a rise. The sharpest decline with age is found in tests which emphasize speed. The remoteness of older persons from their own school days may likewise handicap their performance on tests of a highly academic nature.

It should be noted, in the second place, that individual differences are large at all ages and that overlapping of different age groups is conspicuous. The range of scores within any one age group is much greater than the largest average difference in score between groups. Despite the drop in average score, individual differences show no consistent tendency to decrease with advancing age, but rather tend to increase.

That age itself is a poor guide to ability level is further illustrated in Fig. 16. In this investigation,³¹ the subjects were classified into four levels on the basis of the amount of formal education they had received. The highest level consisted of college graduates with additional professional or graduate training; the lowest level ranged from a total lack of schooling to graduation from elementary school. Although all four groups show a decline in mean score with age, the four curves neither cross nor meet. In other words, the higher educational groups retain their superiority consistently at all ages. It is also interesting to note that the lowest point on the top curve, reached by the 70-year group, is still higher than the highest points on the two bottom curves. Thus a 70-year-old person who had pursued at least one year of graduate work would be expected to score higher than a 20-year-old elementary or high school graduate. In extreme old age, of course, the influence of increasing structural deficiencies must also be considered.

One often hears that adults cannot *learn* as readily as young people. Learning tests administered to persons of different age levels

have shown, however, that the age decrement in learning ability is slight, one investigator ³² estimating the loss to be less than 1 per cent a year between the ages of 22 and 42. Studies of still older groups

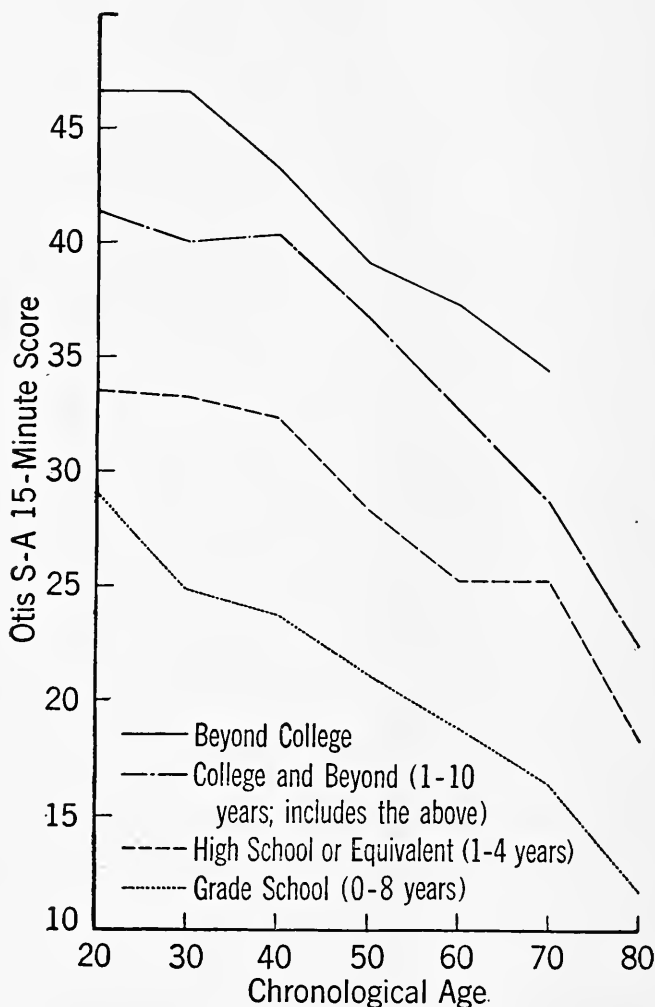


FIG. 16.—AGE CHANGES IN INTELLIGENCE TEST SCORE AT DIFFERENT EDUCATIONAL LEVELS.

(From C. C. Miles and W. R. Miles, in "The Correlation of Intelligence Scores and Chronological Age from Early to Late Maturity," *Amer. J. Psychol.*, 1932, 44, 70, by permission of W. R. Miles and *Amer. J. Psychol.*)

reveal somewhat larger drops,³³ but in every case the drop was greater in the rote learning of meaningless material than in the more meaningful and practically useful tasks. The loss was still greater in tasks which involved the breaking down of old associations. When learning material which is meaningful, useful, and interesting, the older adult can usually compensate for any slight handicap he may have by additional effort, information, and skills, and may actually surpass the younger subjects. It is also interesting to note that individual differences in learning ability tend to increase with age, despite the drop in average scores.

The Effect of Special Training.—It appears from various types of data which have been collected on age changes in mental traits that such changes can best be understood in terms of *training* and the subject's experiential biography. The so-called growth curve of mental development can be considered to be an extended learning curve. Similarly, the slight decrement observed in older adults may be regarded as forgetting through interference from other activities, except when complicated by the structural changes of extreme old age. Most psychological tests consist of tasks which are very similar to school work. The longer the individual has been out of school, therefore, the more chance he will have had to lose the facility in performing such tasks, which he had acquired during his period of schooling. The effect of length of schooling and occupational level upon age decrement becomes intelligible in these terms. The adult who has for many years been engaged in other activities will be less proficient in the sort of task which he himself had at one time performed in school. Those adults whose work involves material of the same sort as that found in the intelligence tests, however, may show a continuous increment with age.

Investigations on the effect of special training upon mental-test performance throw some light upon the nature of the training process itself. Contrary to popular belief, training does not consist in the improvement of any alleged underlying "capacity," but furnishes the individual with specific skills and techniques which will be useful to him in the performance of certain tasks. The concept of training has been unduly colored by the analogy with the strengthening of a

muscle through exercise. Training in psychological functions cannot be considered in these terms.

Although most psychologists are agreed concerning the highly specific function of training, the failure to consider certain of the implications of this fact has led some to conclude that the type of behavior measured by intelligence tests is not susceptible to training. This conclusion is based upon a number of studies on the effect of specific training or coaching upon Stanford-Binet IQ, memory span, and other similar tests. The results of these studies indicate that the individual's score on such tests may be raised markedly by even a brief period of training, but the effect seems not to be permanent. In an investigation³⁴ with the Stanford-Binet, for example, in which a series of coaching periods totaling approximately two hours was employed, the average IQ's of coached and control groups were 100.18 and 133.09, respectively, three weeks after the coaching; but after three years, the averages of the same two groups were 96.18 and 102.82. Other training experiments which employed a similar setup have yielded the same general results. The eventual reduction and almost complete disappearance of the effects of such training have commonly been taken to indicate that the "underlying mental capacities" measured by the tests were not affected by the training.

If we restrict ourselves to the objective facts, however, a much simpler explanation can be found for the gradual decline in the effects of such training. When the training is of brief duration and is *discontinued*, as was done in all of these experiments, we should naturally expect the improvement to fall off through forgetting. If, furthermore, children are tested in different functions at successive ages, as is done largely in the Stanford-Binet, the effects of training will not be manifested over a long period. It is futile to expect that a brief period of highly specific instruction or practice should raise the "general mental level" of a child, especially since such a mental level is itself a manifold of widely diverse and loosely interrelated functions. Training does have a very real effect, however, upon the individual's performance on specific mental tests. And this is of prime importance, since all our observations regarding the subject's psychological make-up are ultimately based upon such concrete behavior.

The Effects of Schooling.—A large number of investigations have been conducted during the past two decades to determine whether schooling affects the individual's general intellectual level. Owing to numerous methodological difficulties, studies on *preschool children* have so far failed to demonstrate conclusively any genuine effect of attendance at a nursery school or kindergarten upon mental development.³⁵ A few comparisons have been made between groups enrolled in different types of elementary schools, as well as individuals equated in initial intelligence but who completed varying amounts of education.³⁶ Such studies suggest a significant relationship between the nature or extent of schooling and intelligence test performance, although the available data do not permit completely unambiguous interpretation. More conspicuous changes in IQ have been reported by some investigators as a result of specially designed curricula or educational programs, particularly with feeble-minded or borderline subjects.³⁷ The latter investigations have opened a promising area of research upon the factors determining intellectual development, but it would be premature to generalize from the present findings without further corroboration.

The Problem of Practice and Variability.—Since it has been demonstrated that training can bring about pronounced changes in mental-test performance, a further question may be raised regarding the differential effects of such training upon individual subjects. Will such training reduce *variability*, or the extent of individual differences in the group? Will the initially better individuals benefit more than the initially poorer? Will subjects tend to maintain the same relative standing in the course of training? If some of these questions are still unanswered, it is not for dearth of data, for they have been repeatedly investigated with a wide variety of materials, methods, and subjects. The entire problem is so beset with technical difficulties, however, as to have been declared insoluble by some. The crux of the matter is that entirely opposite conclusions can be reached if the results are expressed in different forms, a fact which has cast an aura of artificiality over all the data.

One of the chief controversies in this problem centers about the concept of *equal practice*. Does equal practice mean equal amount of

time spent in training or does it mean equal amount of *work* done? With the time-limit method, the slower worker receives practice on less material than the fast worker during the training period. On the other hand, if amount of work done is held constant, then the fast worker will receive practice for a shorter period of time. In either case there is an inequality of conditions. From a practical standpoint, however, the definition in terms of equal time will probably prove more serviceable, since it fits more of the situations encountered in everyday life. When, for example, a person takes a course in music, or golf, or French conversation, he is given a specified number of lessons, each of the same duration. No adjustment is made for the fact that during that period the number of times a piano key is touched or a golf ball hit, or the number of words spoken differed widely from one individual to another. Among the other questions which have to be considered in defining the problem of practice and variability are the *units* in which achievement is measured—whether in terms of time required for each task or amount of work per unit of time—and the *method of expressing improvement*, whether in absolute gains or relative to the individual's original standing.

If, now, we redefine the problem in specific operational terms and inquire whether the absolute extent of individual differences in amount of work successfully completed during a constant time will increase or decrease after all the individuals have spent an equal amount of time in practice, a definite answer can be found in the experimental literature.³⁸ Investigators who have defined the problem in these specific terms have consistently found an *increase in individual differences* with continued practice. Individuals tend to maintain the same relative standing in the group in the course of practice, the initially better individuals maintaining their superiority in the group and the differences among them being even greater after the period of equal training than they were at the outset. Thus it appears that the individual's reaction to training, his ability to profit from training, is itself contingent upon the training he has received in the past and his general experiential background. The more the individual has learned in the past, the more he will be able to learn in the present. To use a rather crude analogy, we might say that practice does not

add to the individual's ability but multiplies it. If one individual's past experience has made him more proficient than another in a given type of activity, he will be better fitted to profit from further instruction for that very reason.

THE DISTRIBUTION OF INDIVIDUAL DIFFERENCES

The Normal Curve.—The same general type of distribution has been found for nearly all measures in which individual differences

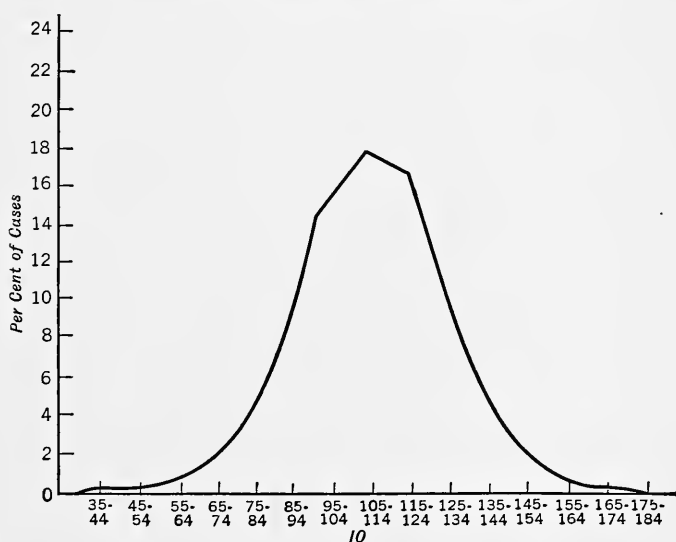


FIG. 17.—STANFORD-BINET IQ'S OF 2904 CHILDREN BETWEEN THE AGES OF 2 AND 18.
(From L. M. Terman and M. A. Merrill, *Measuring Intelligence*.
Boston: Houghton Mifflin, 1937, 37.)

have been recorded. The majority of persons cluster in the center of the range and, as the extremes are approached, there is a gradual and continuous tapering off. The curve shows no gaps or breaks; no clearly separated classes can be discerned. The distribution curve is also bilaterally symmetrical, that is, if it should be divided by a vertical line through the center, the two resulting halves would be nearly identical.

In general, the larger and more representative the sampling of individuals tested, the more nearly does the distribution approach this typical, bell-shaped "normal distribution curve." In Fig. 17,

for example, will be found the distribution of Stanford-Binet IQ's of 2,904 children between the ages of 2 and 18. It will be noted that the largest percentage of cases receive IQ's between 95 and 104, the percentage tapering off gradually from this central group until only a small fraction of 1 per cent is found with IQ's from 35 to 44 or

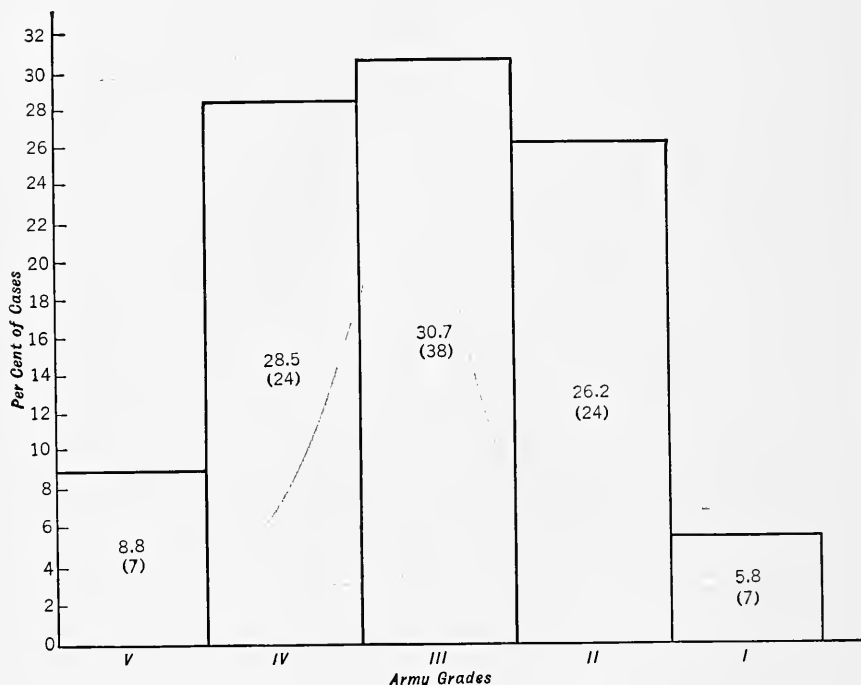


FIG. 18.—DISTRIBUTION OF ARMY GRADES ON THE AGCT.

The expected per cents in a theoretical normal curve are shown in parentheses. (Data from W. V. Bingham, *Inequalities in adult capacity from military data*, *Science*, 1946, 104, 148.)

from 165 to 174, respectively. Fig. 18 shows the percentage of nearly ten million men falling into the five Army grades on the basis of their scores on the Army General Classification Test used in World War II. It will be noted that these percentages correspond quite closely to those to be expected in a mathematically derived normal curve, shown in parentheses. The normal distribution of a nonintellectual trait is illustrated in Fig. 19, based upon the scores

of 600 college women on the Allport Ascendancy-Submission Test. The peak of this distribution falls approximately midway between the ascendant and submissive extremes, and the number of cases tapers off gradually as either extreme is approached.

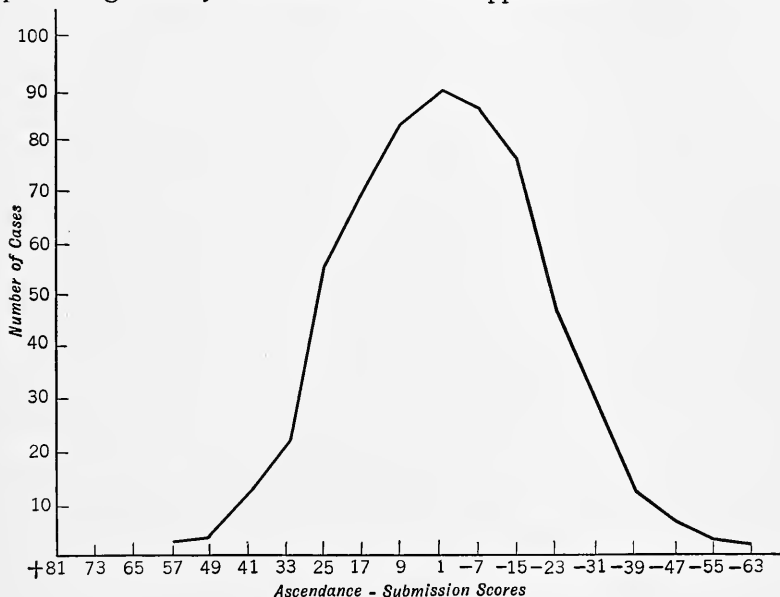


FIG. 19.—DISTRIBUTION OF 600 COLLEGE WOMEN ON THE REVISED ALLPORT A-S REACTION TEST.

(From R. Ruggles and G. W. Allport, Recent Applications of the A-S Reaction Study, *J. Abn. Soc. Psychol.*, 1939, 34, p. 520.)

Conditions Affecting the Shape of the Distribution Curve.—

Under certain circumstances, a type of distribution which deviates conspicuously from the normal curve may result artificially. A skewed curve, that is, one with the peak to the right or left of the center, will be obtained if the group is unrepresentative and contains, for example, an unduly large proportion of very bright or very dull individuals. A skewed curve may also result from the use of a test which is too easy or too difficult for the group. In the former case, there will be a piling up of perfect or nearly perfect scores at the "good" end of the scale; in the latter, a piling up of zero or very low scores at the opposite end. Normality of distribution is, in fact, often taken as evidence that a test is well suited to

the ability level of the group. Inequality of units in the test may also produce irregularities in the distribution of scores.

In a number of behavior characteristics indicative of social conformity, a type of distribution known as the *J-curve* is often found. This curve, named after its resemblance to the letter J, is actually a highly skewed curve, with the majority of persons falling at the end representing complete or nearly complete conformity. A favorite example is based upon the behavior of motorists. At an ordinary intersection with no traffic signal, drivers' behavior will probably follow the normal curve, the majority exhibiting a moderate amount of caution, very few coming to a full stop, and equally few continuing at the same rate of speed with no observation of oncoming traffic. If, however, a stop light and a policeman are installed at the intersection, these external constraints will pull the distribution into a J-curve. In this situation, more than 90 per cent of the drivers will come to a full stop; of the remaining small percentage, a few will slow down markedly, still fewer will slow down slightly, and a very small number will continue at the same rate of speed.³⁹

THE RELATIONSHIP BETWEEN BEHAVIORAL AND STRUCTURAL CHARACTERISTICS

In any discussion of the relationship between psychological and physical traits, we must recognize at the outset the existence of certain abnormal conditions of the organism which have characteristic physical as well as behavioral symptoms. The cretin, the microcephalic idiot, and the paretic are good examples of this. It is unwarranted, however, to generalize from the association found in such pathological cases to a possible connection among individuals in general. To take an obvious and extreme illustration, an individual whose legs have been amputated to the knee may be unable to dance; but we cannot conclude from this that length of leg is correlated with dancing ability and that those persons with longer legs will be the better dancers within a group.

If we turn to the specific investigations on the relationships between mental and physical traits within normal groups,⁴⁰ we find a variety of uncontrolled conditions which make interpretation diffi-

cult. Slight general trends in groups have often been unduly emphasized and the extensive *overlapping* of groups has been ignored. *Age differences* were sometimes present among the groups to be compared, thus producing a spurious connection between certain physical characteristics and mental level. Similarly, the factor of *social status*, which is of the utmost importance in any investigation of the relationship between mental and physical condition, has often been overlooked. The individual reared in a superior home will have richer opportunities for intellectual development and at the same time receive better physical care. He will be brought up under more sanitary conditions, will receive better medical attention, and will thus run less risk of contracting disease than the child in a city slum or remote rural district. This factor is probably responsible for what little correlation has been found between many physical conditions and mental development.

The *direct behavioral handicap* resulting from certain physical deficiencies must also be taken into account. Visual and auditory defects are among the most serious handicaps to normal behavioral development in man. Since our culture is built to such an enormous extent upon a foundation of language, and the latter is acquired chiefly through the eye and the ear, the significance of deficiencies in these fields is apparent. Environmental stimulation is, to a large extent, cut off by blindness or deafness. The individual who is so afflicted is psychologically "isolated" from cultural contacts in the same sense as the Wild Boy of Aveyron, the wolf children of Midnapore, or Kaspar Hauser, discussed in a preceding section. It is not surprising, therefore, to find that the average IQ of the blind is closer to 90 than to 100, and that of the deaf in the neighborhood of 80, even when they are examined with specially adapted intelligence scales.⁴¹

When we inquire into the relationship between hair and eye coloring, facial characteristics, head dimensions, and various cranial indices * on the one hand and intellectual and emotional traits on the other, we find consistently negative results. All investigations by psychologists in which objectively observed or tested behavioral

* The best known of which is probably the cephalic index.

traits have been compared with accurately measured physical characteristics yield consistently low and insignificant correlations.⁴² Of special interest in connection with "type theories," to be discussed in the following section, are the various indices of *body build* which have been proposed from time to time. Among the most widely used of these are the height-weight ratio and the morphologic index. The latter is computed by adding the average arm length to the average leg length, and dividing this sum by the trunk volume. Individuals with a high morphologic index are generally tall and slender, with relatively long limbs; those with a low morphologic index are stocky, with a relatively large trunk.

Such indices have also failed to show any significant correlation with behavioral traits. Thus in one investigation on 500 college freshmen of each sex, the correlation between height-weight ratio and intelligence-test score proved to be only .03 for the men and .04 for the women.⁴³ In another study, the correlation between morphologic index and intelligence-test score in a group of 434 male freshmen was .14.⁴⁴ Consensus ratings of five personality traits by five judges likewise yielded either zero or low and insignificant correlations with morphologic index.⁴⁵

THEORIES OF CONSTITUTIONAL TYPES

In the effort to simplify the problem of individual differences, a number of type classifications have been proposed from time to time. The entire range of human variation would thus be reduced to a small number of basic types, and each individual would be described as a more or less close approximation to one of these types. Such type theories date back at least to the fifth century B.C. when Hippocrates first formulated his twofold classification of mankind on the basis of physical constitution into *habitus apoplecticus* and *habitus phthisicus*. Many similar theories have been proposed since that time, and even now exponents of type psychology can be found. The terminology of type theories has become such an integral part of our everyday language that it is almost impossible for us to speak about people without reference to some such hypothetical categories.

Kretschmer's Theory.—In modern times, the type theory proposed by Kretschmer⁴⁶ has been one of the most influential in stimulating psychological research. Physically, Kretschmer classified individuals into four groups, the *pyknic*, *athletic*, *leptosome*, and *dysplastic*. The *pyknic* type of body build is short and thick-set, with relatively large trunk and short legs, round chest, rounded shoulders, and small hands and feet. The *athletic* has a more proportionate development of trunk and limbs, well-developed bones and muscles, wide shoulders, and large hands and feet. The *leptosome* is generally characterized by small body volume in relation to height. He is tall and slender, with relatively narrow chest, long legs, elongated face, and long, narrow hands and feet. The *dysplastic* is a relatively small category in which are placed all individuals manifesting some marked abnormality of development, disproportion, glandular imbalance, or other defect.

The basic contention of Kretschmer's theory is that there exists a relationship between the body types which he describes and two fundamentally opposed "temperaments," the cycloid and the schizoid. The cycloid individual manifests personality traits which in extreme cases would be classified under the circular or manic-depressive form of insanity; the schizoid tends toward schizophrenia. Kretschmer maintained that the cycloid is usually *pyknic*, whereas the schizoid is *leptosome* or, less frequently, *athletic*. This theory was subsequently extended to apply to normal individuals, the terms *cyclothyme* and *schizothyme* having been employed to denote the two normal types. The former is described as social, friendly, lively, practical, and realistic; the latter is quiet and reserved, more solitary, timid, and shut-in. It will be noted that these descriptions correspond closely to the familiar classification into introvert and extrovert, first proposed by Jung.⁴⁷

Type theories such as Kretschmer's seem to imply a bi-modal distribution of psychological characteristics, that is, a distribution having two peaks or modes, with perhaps a few intermediate cases falling between the peaks. The distributions actually obtained, however, have consistently failed to substantiate any such classification of people into sharply defined types. Most persons fall into the intermediate or "mixed" area and there is no sharp line of demarca-

tion between different degrees of a trait. Moreover, it will be recalled that the correlations between various characteristics of body build and of behavior have proved to be consistently low and negligible.

It is possible, however, to conceive of types as originally pure "biotypes" within the human species, which, through successive generations of interbreeding, produced the present "mixed types." The latter would now far outnumber the remaining specimens of pure types. A normal distribution could thus result, with the numerically largest "mixed types" in the center and the relatively few pure specimens at the extremes. It would also follow that any relationship between psychological and structural traits existing in the pure biotypes would not be readily discernible in measurements based upon a random sampling, since the "mixed types" would overshadow the pure types in such a sampling.

In order to test Kretschmer's hypothesis, when reformulated in terms of original "biotypes," individuals were chosen who were distinctly classifiable as pyknics or leptosomes on the basis of physical measurements.⁴⁸ These groups were given intelligence and personality tests as well as a variety of more specific tests directly suggested by Kretschmer or his followers and including visual reaction time, speed of tapping and of writing, cancellation, substitution, color fusion, Rorschach, etc. In no test was the difference between the average scores of pyknics and leptosomes significant. Thus individuals chosen because they represented contemporary specimens of "pure types" in their physical characteristics could not be differentiated in the psychological characteristics allegedly associated with such types. Similar results were obtained when comparing the relative frequency of pyknics and leptosomes among schizophrenics and manic-depressives.⁴⁹ Any differences in frequency of the physical types tended to disappear when such factors as age and occupational level were held constant.

Sheldon's Theory.—A different approach to typology is represented by the schema of classification proposed by Sheldon.⁵⁰ Rather than placing individuals into distinct categories, this system rates both "physique" and "temperament" along a continuous scale, merely substituting a three-variable for a uni-variable schema of classifica-

tion. Bodily structure is described in reference to three components: (1) *endomorphism*, or the predominance of the digestive viscera; (2) *mesomorphism*, or the predominance of somatic structures such as bone, muscle, and connective tissue; and (3) *ectomorphism*, or fragility and linearity, with a predominance of skin and nervous system. Each individual is classified on a 7-point scale in reference to all three categories. Thus the "somatotype" of an extreme ectomorph would be 1-1-7, that of an extreme mesomorph 1-7-1, and that of an individual falling at the midpoint with respect to all three components 4-4-4.

A similar three-variable schema was developed for the classification of temperamental characteristics, including viscerotonia, somatotonia, and cerebrotonia. The first of these, *viscerotonia*, is characterized in its extreme manifestations by general relaxation, love of comfort, sociability, conviviality, and gluttony. *Somatotonia* is marked by a predominance of muscular activity and of vigorous bodily assertiveness. In *cerebrotonia*, restraint, inhibition, and the desire for concealment predominate, the individual shrinking from social contacts and repressing somatic and visceral expression.

Sheldon suggests a correspondence between the three temperamental components of viscerotonia, somatotonia, and cerebrotonia and the morphologic components of endomorphy, mesomorphy, and ectomorphy, respectively. The principal advantage of Sheldon's typology is undoubtedly its consistency with a continuous, normal distribution of both morphological and behavior characteristics. The data presented in support of this classification, however, are limited and inconclusive. This is particularly true of the temperamental classification and of the suggested relationship between temperamental and morphological types.⁵¹ At its present stage, this system can only be regarded as a plausible hypothesis for further investigation.

THE NATURE AND INTERRELATIONSHIPS OF PSYCHOLOGICAL TRAITS

Variation within the Individual.—The study of variations from trait to trait within the individual is of both practical importance and theoretical significance. When a child is classified as intellectually

inferior on the basis, let us say, of Stanford-Binet IQ, there is still much that remains to be known about his mentality. Is he equally inferior in all respects or does he exhibit significant discrepancies in his mental development? Is he normal or even superior along some specific lines? Similarly, in the case of a child with a very high IQ, we may inquire in what ways he is superior. How uniformly does he excel the average child in intellectual performance? The intelligence test, furnishing a single summary figure to characterize the child's general mental level, often obscures important facts. Two individuals who obtain the same total score may present very different "mental pictures," or *psychographs*, when their performance along specific lines is analyzed.

If the individual's abilities were all approximately at the same level, a single summary score would be quite adequate to describe him. But if appreciable variation in the individual's standing in different traits is the rule, then such a score is ambiguous and may at times be definitely misleading. It is therefore necessary to inquire into the extent of variation within the individual. The data on this question have been gathered from a variety of sources. Case studies are available of individuals who exhibit marked asymmetry of development along different lines. Such individuals can be found among the feeble-minded and the intellectually superior, as well as among the normal. Quantitative measurements of the extent of variability from trait to trait in large random samplings have also been obtained. Finally, correlational analysis has further clarified and has introduced certain refinements into the problem of trait relationships and the identification of basic traits. Typical data obtained by these three approaches will be considered.

Case Studies of Asymmetrical Development.—Among the feeble-minded are occasionally found individuals who display an exceptional talent along some specific line. Such persons have been designated "*idiots-savants*," a term which has been criticized for being somewhat misleading. The usual idiot-savant is neither particularly wise nor an idiot. He is not sufficiently deficient to be classified as an idiot, but frequently falls at the moron or borderline level. And he is "wise" only in a very limited field. In the practical man-

agement of his own life he is ordinarily a complete failure. He is sufficiently deficient in other respects as to be unable to capitalize his own special talent in making an adjustment to normal everyday life. Like all extreme deviations in the distribution of any trait, idiots-savants are relatively rare. Because of their unusual characteristics, however, they attract a good deal of attention and, as a result, a number of fairly complete descriptive accounts are on record.

The special talent of the idiot-savant may be observed in almost every type of mental activity. Mechanical aptitude, ability in drawing and painting, a phenomenal memory, arithmetical proficiency, a special gift in music, all are represented. Two of the best known examples⁵² are Gottfried Mind, known as "the cat's Raphael" because of his excellent drawings of cats, and J. H. Pullen, "the genius of Earlswood Asylum," who displayed extraordinary mechanical ingenuity coupled with talent in drawing and carving. Several cases of special musical talent have also been reported. The feats of memory and of arithmetical calculation performed by some feeble-minded individuals have frequently attracted notice.⁵³

The one field from which idiots-savants seem to be conspicuously absent is that of linguistic or verbal aptitude. This fact throws some light upon our concept of general intelligence. It is gradually being recognized that the latter is largely *identified* with verbal ability in our culture. Most intelligence tests consist, to a large extent, of verbal tasks. Success in the practical business of everyday life is also more closely linked to linguistic facility than to other traits. A serious deficiency in the power of verbal expression will thus brand an individual as incompetent from many points of view. Conversely, a person who is especially proficient in verbal traits may thereby compensate for deficiencies along other lines and will rarely, if ever, find his way into an institution for the feeble-minded. No other single talent seems to be such a saving grace in our civilization!

Marked asymmetries of development may also be found among those classified as normal or superior on the basis of general intelligence tests. Case studies of such individuals reveal the same traits that are found in a survey of idiots-savants. Thus special aptitude in music, drawing, and mechanics may be found in persons of normal intelligence. Or conversely, marked deficiencies in these traits may

be combined with superior intelligence. Numerous cases of mathematical prodigies and so-called "lightning calculators" have been investigated by psychologists. Such case studies suggest that numerical aptitude also may occur as an independent trait. It is only verbal ability that cannot be differentiated from the individual's alleged "general mental level."

The Measurement of Trait Variability.—In a few investigations, attempts have been made to obtain a measure of the extent of *trait variability*, that is, the variability from trait to trait within the individual. In such studies, standardized tests were given to large groups of subjects who were not specially selected because of asymmetrical development. The same statistical techniques commonly employed to measure individual differences can also be applied to the measurement of trait differences, provided the scores on the different tests are reduced to the same units.

In one investigation, the scores obtained by 107 high school freshmen on 35 tests were analyzed from the standpoint of both trait and individual variability.⁵⁴ The tests included several subtests from intelligence scales, as well as tests of motor characteristics, perception, attention, and personality traits. After all of the scores had been converted into comparable units, the standard deviation of each individual's scores on the 35 tests was computed as a measure of trait variability, and the standard deviation of the 107 individuals in each test was computed as a measure of individual variability. From these measures it was found that the trait variability was approximately 80 per cent as large as individual variability. Although the exact figure would differ with the number of tests employed, the variety of functions tested, and the nature of the group, it is fairly well established that a large amount of trait variability will be found within any sampling of individuals grouped together for practical purposes. For example, in a study conducted in France on groups of flight candidates, vocational school girls, apprentices, and Paris school children, trait variability tended to be slightly over 75 per cent as great as individual variability within the separate groups.⁵⁵

It is interesting to note that such unevenness of ability is no greater among bright than among normal or dull subjects. The

popular notion that intellectually superior children tend to be "lopsided" in their mental development is not supported by the data. In fact, there is some evidence to suggest that trait variability is slightly greater among the *duller* subjects.⁵⁶

One investigation was specifically designed to study the differentiation of abilities among highly gifted children.⁵⁷ A group of 100 children whose IQ's ranged from 136 to 180 and averaged 149.4 were compared with a control group of 96 unselected eighth grade school children of approximately the same *mental ages* as the superior group. Both groups were given the Stanford Achievement Test, as well as information tests in special fields. An analysis of the inter-test variations within each subject's scores revealed many differences which were large enough to be significant, that is, differences which exceeded the chance fluctuations to be expected from one score to another. When every possible pair of tests was compared, the percentages of such significant trait differences ranged from 13 to 37 in the gifted group, and from 13 to 40 in the control group. The average percentages are 28.89 and 27.82 for gifted and control groups, respectively. These gifted children thus showed about the same degree of specialization in the abilities tested as normal, older children of the same mental ages.

Evidence from Correlation.—The examination of extreme examples of asymmetrical development, as well as the measurement of trait variability in random samplings, suggests that superior talents in one line may be associated with inferior abilities along other lines. It is not to be concluded, however, that compensation is the rule. Superior standing in one trait does not imply inferiority in another. We have cited only examples in which individuals with a high standing in a certain trait *A* make a poor showing in a second trait *B*. We could with equal facility find cases of individuals superior in *A* as well as *B*, or superior in *A* and average in *B*. This is just the situation indicated by a zero correlation. If various abilities are specific and mutually independent, so that an individual's standing in one tells us nothing about his relative standing in another, the correlations among them will be either zero or very low.

The evidence from correlational analysis corroborates that from case studies. Little or no correlation is found among such traits as musical, artistic, mechanical, numerical, and verbal aptitude. The correlations between tests falling within any one of these groups tend to be high; when tests from different groups are compared, however, the correlations are low and often insignificant. Similarly, tests of all of these traits, with the exception of verbal aptitude, correlate low with most intelligence scales. It should be added that such specialization of ability is more characteristic of adults than of children in our culture. During childhood, ability appears to be more generalized and performance in different intellectual functions correlates quite highly.⁵⁸ A single intelligence test score, like an IQ, would thus be more meaningful and unambiguous in the case of a child than in the case of an adult. There is also some evidence that education leads to a greater differentiation of ability.⁵⁹ Thus among college students, the intercorrelations of psychological test scores in different areas tend to be lower than among adults of similar age but lower educational level.

The Search for Differentiable Mental Traits.—The lack of correlation found between intelligence-test score and a number of abilities, especially among well-educated adults, raises the question as to what constitutes "intelligence." The original purpose of intelligence tests was to sample a large number of different abilities in order to arrive at an estimate of the subject's general level of performance. In so far as the individual's standing in specific functions varies, such a general estimate is inadequate. It is apparent, moreover, that current intelligence tests do not furnish even a satisfactory estimate of the individual's average ability, since they are overweighted with certain functions and omit others. Thus in the non-language and performance tests of intelligence, spatial aptitude plays a large part. Most paper-and-pencil tests, on the other hand, measure primarily verbal aptitude, and to a lesser degree, numerical ability. Since the latter type of test is by far the most frequently employed, the term "intelligence" has come to be used almost synonymously with verbal ability. Total mental age on the Stanford-Binet, for example, has been found to correlate from .65 to .91 with per-

formance on the vocabulary test of the scale within single age groups.⁶⁰

The inquiry into the relationships among mental traits discloses an even more basic problem. The question may now be reformulated in terms of the identification and nature of the traits themselves. Various theories of "*mental organization*" have been proposed, ranging from a strict specificity of all mental activities, implying almost complete absence of correlation, to the presence of a single general factor underlying all mental functions. The bulk of the available evidence at present supports an intermediate view in terms of a relatively small number of *group factors*. According to such group-factor theories, there are common elements only through certain limited groups of activities, such as those included under the caption of verbal, numerical, or spatial aptitude. The correlations among tests in any one of these groups would thus be expected to be high, while those between groups of tests would be low and insignificant.

The identification of psychological traits which can be differentiated from each other and which vary independently is not based solely upon correlation coefficients. More refined statistical procedures have been developed for the analysis of relationship within a set of test scores. These methods have become known under the name of *factor analysis*. It is possible, by such techniques, not only to determine the number and location of independent factors necessary to account for the obtained relationships, but also to estimate the weight or "loading" of each factor in each of the tests.⁶¹ All of these methods, however, are ultimately based upon relationships among correlation coefficients. They are essentially descriptive techniques, however refined, and cannot get beyond the immediately observed response to the test situation.

A few investigations by both genetic and experimental approaches suggest that the "traits" or factors revealed by factor analysis cannot be regarded as fixed and immutable. Not only do factor patterns change with age and education, but the location and weight of the differentiable factors can be experimentally altered by the introduction of relevant experiences.⁶² The data suggest that the mental activities of the individual, although tending at any one time to be organized into certain major clusters or "traits," are susceptible

to considerable reorganization as the individual undergoes new experiences. Thus the role of environment is again forcefully demonstrated. The existence of innately fixed patterns of trait relationship could scarcely be expected when the individual's behavior has been found to be so profoundly influenced by experiential conditions.

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CHAPTER XIII

MAJOR GROUP DIFFERENCES

By ANNE ANASTASI, *Fordham University, New York*

In the preceding chapter, we surveyed some of the major problems and results on individual differences and analyzed a few of the factors which produce variation from one person to another. With this background, we may now turn to an examination of certain *groups* into which individuals are commonly classified. Such groupings have been built up through social and cultural traditions, and illustrate the general tendency to employ rigid categories and sharp divisions. Thus individuals are popularly classed into the normal and the abnormal, the genius, the feeble-minded, the insane, the neurotic, etc. Psychological differences are expected, or at least sought, between the sexes or among nations and "races." A large number of similar differentiations could be made, such as that between urban and rural populations, or among groups inhabiting geographically different regions, as mountainous or flat, inland or coastal, cold or warm.

From the standpoint of psychological traits, these various groupings are arbitrary and artificial, like all rigid classifications of individuals. The multiple and complex determination of the individual's behaviorial development should in itself make us skeptical about any simple system of characterizing people. Yet it is an all-too-common practice to expect an individual to be dependable, or shiftless, or dull, or excitable, or poor in mechanics, or to ascribe to him dozens of similar characteristics, simply from a knowledge that such a person is a man or a woman, or that he belongs to a particular "race" or nation.

It is partly to clarify these muddled popular notions that the empirical study of group differences ought to be undertaken. To be sure, a careful examination of the principles underlying individual

variation in general should suffice to show the fallacies inherent in many popular claims regarding group differences. But when beliefs are as deep-rooted and emotionally tinged as those regarding many group relations, they are not easily dislodged. Direct evidence on the nature of group differences is more convincing than deductions from generally established principles.

From a theoretical point of view, the analysis of group differences is a valuable adjunct to the investigation of individual differences in general. The existence of culturally diverse groups may be regarded as furnishing a natural experiment in the production of human variability. If psychological differences among groups are investigated with reference to the factors which brought them about, the understanding of individual differences is thereby advanced.

It is not for lack of data that confusion prevails in regard to group differences in psychological traits. The field has attracted many investigators and a sizable collection of material on such comparisons is now available. But these data are usually difficult to interpret because of the multiplicity of uncontrolled factors operating to produce each observed difference. The same set of data has frequently led to opposite conclusions in the hands of different writers. It is therefore of basic importance to analyze the special difficulties encountered in making group comparisons. These difficulties can be resolved into two essential questions: (1) *who* shall be compared; and (2) *how* is the comparison to be made. Each question will be examined in turn in the two sections which follow.

PROBLEMS OF SAMPLING

Sampling Error.—In any one investigation, only a sample of the entire population is employed. For example, if the population under consideration is defined as public school children in American cities, data may be gathered on some 5000 or 6000 children in a dozen schools. From these results the investigator generalizes to the entire population. If the sampling was carefully chosen to be representative of the given population, such conclusions will not be far in error. The figures thus obtained, however, will not be identical to those which would have been secured by testing the entire popula-

tion of American city public school children. Nor will results from successive samplings of the same population coincide completely. Had a different sampling of 5000 city public school children been employed, slightly different results would have been obtained.

This variation in results from sample to sample within the same population is known as *sampling error*. Statistical measures of reliability furnish a theoretical estimate of the probable limits within which such errors will fall. Reliability means, in this case, the degree of consistency among the results obtained on different samples of the same population. Formulas are available for the computation of the sampling errors of most statistical measures, such as averages, differences between averages, measures of variability, and correlation coefficients.

The determination of whether a difference is significant or whether it may have resulted simply from chance fluctuations of sampling is basic to any group comparison. When we ask, for example, "Does this mechanical aptitude test show a significant difference in favor of boys?" we mean simply this: "Would the boys' average score still be higher than that of the girls if we were to test the entire population of boys and girls from which our samples are drawn?" We refer to the difference actually found within any one sample as the "obtained" difference, and to the difference in the entire population in which we are interested as the "true" difference.

By simple formulas,¹ we can compute the standard error of the difference ($\sigma_{\text{diff.}}$) and with it, the *critical ratio*, or *t*. The latter is simply the ratio of the obtained difference to its standard error ($t = \text{diff.}/\sigma_{\text{diff.}}$). It has been customary for many years to regard a critical ratio of 3 or higher as evidence that the obtained difference was significant. In other words, when the obtained difference in favor of, for example, the boys is 3 or more times as large as its standard error, we can be virtually certain that there is a "true" difference in favor of the boys in the entire population. It may be added parenthetically that, in place of the standard error, the probable error has sometimes been used as a measure of sampling error. This is particularly true of the earlier investigations. In such a case, a minimum critical ratio of 4 (rather than 3) was required to meet the conventional standard of a "significant difference."

There has been a growing tendency for statistical workers to express the significance of a difference more precisely in terms of the actual *probability* of a true difference in favor of one or the other group. With a t of 3, the probability that the obtained difference indicates a true difference is about 99.7 out of 100. For the probability to be exactly 99/100, the critical ratio would have to be 2.58. In such a case, the chances that the population difference favors the same group which excelled in our tested sampling are 99 out of 100, and the probability that the difference is either absent or in favor of the other group is only 1 out of 100. This is the basis for the frequently encountered statement that the difference is "significant at the .01 level of confidence"; the chances are .01, or 1 out of 100, that our conclusion is in error.*

The standard error of an obtained difference depends upon the *size* of the samplings employed as well as upon the amount of *variability* within the samplings. It is apparent that the larger the samplings, the more reliably will the results be established. If the samplings were infinitely large, the standard error would be zero, since the entire theoretical population would then have been included. In some of the investigations on group differences, the samples employed have been so small as to yield relatively large standard errors. The sex or race differences reported in such studies may thus have been due entirely to sampling error.

Similarly, wide variability within each group renders the differences between averages less reliable. If all men were of identical height, for example, and all women were likewise equal in height, then sex differences in height could be reliably established by comparing only one representative of each sex. All other samplings would yield the same difference, since variation within each sex would be zero. The greater the variability within either group, the larger will be the standard error of the obtained difference. In the formulas for the computation of standard errors, both the number of cases and the variability of each group are taken into account.

Selective Factors.—In any group comparison, selective factors

* With very small samples, the critical ratio must be considerably larger than 2.58 to permit the same level of confidence in the results.²

may operate to vitiate the results. Whenever a group is not a random or representative sample of the population from which it is drawn, it is said to be a select group. It is impossible to generalize from the results obtained with such a sampling to the total population. An additional complication arises when two populations are compared, since selection may have operated differently in the two groups. Thus one group may represent a superior sampling of its population, while the other represents a mediocre or inferior sampling of the second population.

Immigrant groups furnish a good example of the differential operation of selective factors. Immigrants coming to the United States from different countries, for example, are usually neither fair samplings of their home populations, nor comparable among themselves. If it could be shown that immigrants from all nations were drawn consistently from, let us say, the lower socio-economic or intellectual levels, then such groups would at least be comparable with each other. But it is well known that, through purely historical reasons, the immigrants coming from certain nations at a given time may represent a relatively inferior sampling of their population, from others a more nearly random or average sampling, and from still others a relatively superior sampling.

It might seem that selective factors would not play such a large part in comparisons between the two sexes. Certain investigations on sex differences have nevertheless proved inconclusive because of the operation of previously unsuspected selective factors. Thus in two investigations on sex differences, the Pressey Group Test of Intelligence was administered to 2544 elementary school children³ between the ages of 8 and 16 and to 5929 high school seniors⁴ ranging in age from 16 to 23. In the elementary school groups, the girls excelled at all ages, although among the 16-year-olds this difference was not significant. Among the high school seniors, however, the relationship was reversed, the boys surpassing the girls.

This reversal becomes intelligible if we examine the relative number of pupils of each sex in the elementary grades and in the senior year of high school. Throughout the high school period, there is a much more rapid elimination of boys than girls. Boys whose

academic work is unsatisfactory are more likely to leave school and go to work, whereas girls tend to be kept in school longer. Girls also seem to adjust better to the school routine in general. The less intelligent girls will exert more effort and manage to pass sufficient subjects to stay in school, while boys in the same situation are more likely to rebel against school work. This explanation was borne out by an examination of the scholastic history of those students who had dropped out in the course of their high school work in the study cited above.

Much of the evidence offered in support of the once popular doctrine of sex differences in *variability* is rendered invalid by selective factors. This doctrine proposed that although the average ability of men and women might be equal, the distribution of ability of men covered a wider range than that of women. Similarly, more men than women would be found at the extremes of the distribution, corresponding to feeble-mindedness and genius. In support of this contention were cited the admission statistics of institutions for the feeble-minded. Surveys conducted in several countries revealed a consistent excess of males among the inmates.

Subsequent investigations revealed, however, that the discrepancy results from social and cultural factors which operate differently in the admission of men and women to institutions. Unless a woman exhibits a pronounced degree of mental defect, she tends to be kept at home, or she may earn her livelihood by turning to such activities as housework, prostitution, or marriage. The boy, on the other hand, is forced into industrial work at a relatively early age and will soon reveal his mental deficiency in the severe competition which he encounters. Thus, although there is an excess of males in institutions for mental defectives, it seems that there are more feeble-minded females outside of institutions. An investigation of several thousand cases in New York City showed that the women brought to a psychological clinic for examination were on the average older and more deficient than the men. The difference in IQ was even greater when the cases actually committed were compared.⁵

A similar differential selection has been found to operate in admissions to special classes for mentally retarded children in the public school system. One survey⁶ showed about three times as

many boys as girls enrolled in such special classes. The remaining girls of corresponding ability, however, were found in regular public school classes. Apparently the differences in social and economic conditions met by the two sexes have led to a "double standard" in the classification of boys and girls as mentally retarded.

Direct measurements of the extent of variability in test scores in more representative and comparable groups have in general failed to substantiate the doctrine of sex differences in variability. In what is probably the most complete sampling of a population yet undertaken, the Stanford-Binet was given to all children born in Scotland on any of four specified days.⁷ This group, consisting of 444 boys and 430 girls with an average age of 10 years, showed an insignificant sex difference in variability, the critical ratio of the difference being less than 1. No significant sex difference in variability was likewise found in an American survey in which 5069 boys and 5010 girls in grades 3 to 8 were tested with the National Intelligence Test.⁸

Overlapping of Distributions.—Although one group may excel another in a given trait by a large amount, individuals can be found in the poorer group who will equal or surpass individuals in the better group. Owing to the wide range of individual differences within any one group as contrasted to the relatively small difference between groups, an individual's membership in a given group furnishes little or no information about his standing in any trait or behavioral characteristic. The poorer end of the superior group coincides with the better end of the inferior group, and this overlapping is very large even when the group averages differ markedly.

An example of overlapping will be found in Fig. 20. This shows the distribution curves of a group of 189 boys and 206 girls in the third and fourth elementary school grades on a test of arithmetical reasoning. The average score of the boys is 40.39 and that of the girls 35.81. The difference between these averages is 4.85 and the standard error of the difference is only 0.85. The difference is thus over five times as large as its standard error and can be regarded as significant with a high degree of confidence. An examination of the distributions, however, reveals extensive overlapping between

the two groups. Large proportions of the boys' and girls' scores fall within the same limits. Further evidence of overlapping is to be found in the fact that 38 per cent of the girls obtained scores which were higher than the boys' average, and 24 per cent of the boys scored below the girls' average.

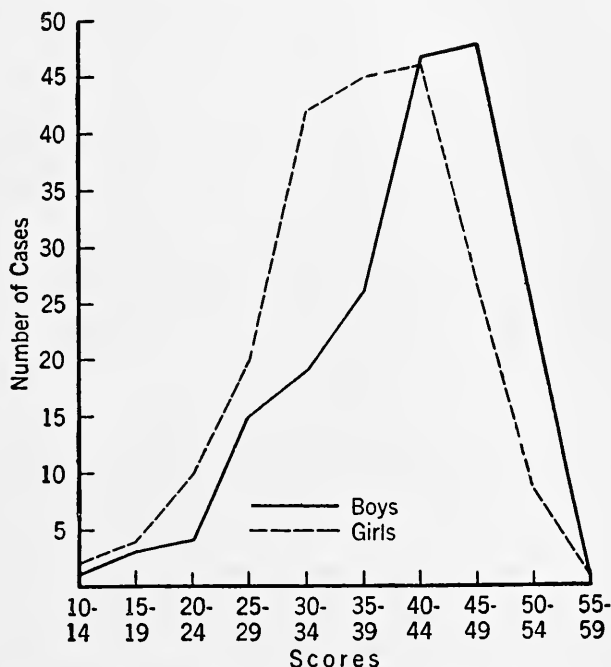


FIG. 20.—DISTRIBUTION OF BOYS AND GIRLS ON A TEST OF ARITHMETICAL REASONING.

(Data from Schiller, in "Verbal, Numerical, and Spatial Abilities of Young Children," by permission of Archives of Psychology, and adapted from Anastasi "Differential Psychology" by permission of the Macmillan Co.)

It is therefore apparent that because of overlapping of distributions, the relationships established for the averages of two groups may be entirely reversed when comparisons are made between individuals from the same two groups. This fact was very succinctly put by Samuel Johnson who, when asked which was superior, man or woman, is reported to have replied: "*Which man, which woman?*" The individual, and not the group, should be the unit of observation.

Developmental Rate.—A further complication in the analysis of group differences arises from a possible difference in developmental rate. In connection with sex differences, for example, it has been clearly established that girls reach maturity earlier than boys. Moreover, at any one age during childhood, girls tend to be farther advanced than boys toward their eventual adult status.⁹ A number of writers have proposed that girls might be accelerated in mental as well as physical development. Thus the fact that girls of elementary school age excel on most intelligence tests has sometimes been attributed to such a sex difference in developmental rate. If this difference existed, it would be necessary to equate the sexes in regard to developmental stage or physical maturity, rather than chronological age, in order to obtain comparable groups. But such a procedure would introduce an inequality in amount of training and general environmental stimulation. This problem only arises, of course, in the comparison of children, and does not apply to adults. Children, however, have been the most frequent subjects for surveys on group differences, both because of their greater accessibility in large numbers and because they have been exposed to a relatively more homogeneous environment.

It should be noted that intellectual acceleration of girls has not been directly demonstrated. Its possibility has only been inferred by analogy with physical development. It is doubtful, however, whether physical maturity can have such an influence upon intellectual development. The data on the relationship between psychological and physical traits are too consistently negative to warrant such an assumption.¹⁰ In emotional and other personality traits it is probable that the onset of puberty and the relative physiological maturity of the individual introduce a disturbing factor into sex comparisons at certain ages. In intellectual development, however, the environmental stimulation to which the individual has been exposed is far more significant than slight differences in physical condition.

In connection with race differences, the suggestion has been made by some writers that the more "primitive" races may mature earlier, mentally as well as physically. According to such a view, the alleged intellectual inferiority of certain racial groups would fail to appear in early childhood because of their more rapid developmental rate,

but such inferiority should become increasingly evident as maturity is approached. Superficially, this theory would seem to be corroborated by the age decrement in verbal intelligence-test scores sometimes found among American Indian and Negro children.¹¹ The fact that non-verbal tests more often fail to show such a decrement should, however, make this interpretation suspect.¹² Moreover, it will be recalled that age decrements are characteristically found among white children living in isolated rural communities and in a wide variety of other underprivileged groups. Finally, it should be borne in mind that most intelligence tests do not measure the same functions throughout their range and that they tend to become increasingly dependent upon educational background at the upper ages.

PROBLEMS OF MEASUREMENT

It should be apparent from the preceding section that the choice of subjects for the investigation of group differences presents many difficulties. If we now raise the further question as to *how* these differences are to be measured, we are faced with many additional problems. Individuals who differ in their "race" or their sex usually differ in many other respects as well. It is very difficult to *isolate* the factor of race or sex so as to determine its direct influence upon the individual's behavioral development. It becomes necessary, therefore, to try to determine the degree to which these other concomitant variables influence mental-test performance.

General Cultural Background.—Such conditions as the customs, traditions, habitual activities, or attitudes among which the individual is reared may affect his mental development—and his mental-test performance—in countless ways. A few examples of their operation will have to suffice. Although reared in the same home, for example, brothers and sisters cannot be assumed to have been exposed to identical psychological environments. Even in the most "enlightened" and "progressive" homes, *sex distinctions* are introduced which cannot fail to affect subsequent development. Boys and girls are usually given different toys and games, and different

books to read. Girls are generally considered to be weaker and more frail than boys; they tend to be sheltered more, and are taught to be neater and quieter than their brothers. Even in those few cases in which the parents themselves may not foster these differentiations, the child is sure to come into contact with such attitudes among his playmates or other associates outside the home.

In the field of racial comparisons, the influence of cultural background upon mental-test performance is more clearly apparent. The test often demands specific information which the individual has had little or no opportunity to obtain in his own environment. Thus the use of such objects as bicycles, electric bulbs, postage stamps, and mirrors in picture tests may place individuals in certain cultures at a considerable disadvantage. Certain traditional *attitudes* may also interfere with the subject's test performance. Porteus¹³ reported, for example, that he found it difficult to convince Australian aborigines that they were to solve the test problems individually, without assistance from their tribal brothers, because of their custom to settle all important problems in tribal conferences. Klineberg¹⁴ observed that among the Dakota Indians it is considered bad form to answer a question in the presence of someone who does not know the answer, or to give an answer of which one is not absolutely sure.

Another important point to consider in evaluating racial differences in mental-test performance is the significant part played by *speed* in such tests, and the varying emphasis placed upon speed in different cultures. This was vividly demonstrated in an investigation on white, Negro, and Indian boys with the Pintner-Paterson Performance Scale.¹⁵ In accuracy of performance, as measured by the number of errors on each test, the Indians excelled the whites, and the Negroes were either equal to or slightly superior to the whites. All measures of speed, on the other hand, favored the whites. A comparison of groups belonging to the same race but living in a different cultural milieu suggested that these differences in speed were cultural rather than biological. Thus New York City Negroes clearly excelled West Virginia rural Negroes in every comparison. Similarly, the Indians attending a government school conducted by white teachers were consistently faster than those tested on the reservation. The relatively insignificant part which speed plays in the life of the

reservation Indian or the rural southern Negro might fully account for these results.

Finally, the relatively intangible but highly effective factor of *social expectancy* should be mentioned. This operates to perpetuate group differences, however they may have been established. What is expected of an individual is often a powerful influence in the determination of what he will do. When such expectation has the force of social tradition behind it and is corroborated at every instant by family attitudes, everyday contacts in work and play, and nearly all other encounters with one's fellow-beings, it is difficult not to succumb to it. As a result, the individual himself becomes convinced that he is "superior" or "inferior," or that he possesses this or that talent, interest, or attitude, according to the dictates of his particular culture.

Education.—That the *formal education* of different racial and national groups differs in amount and in kind is too obvious to require much elaboration. Adult immigrant groups tested in the United States, for example, have usually received much less formal schooling than the average native-born American with whom they are compared. American Indians and American Negroes, although born in this country, receive as a group an education which is far inferior to that of the white population. Apart from poorer equipment, fewer and less adequately trained teachers, and more inaccessible schools, school attendance is much lower among such groups. This results partly from poorer roads and less adequate means of transportation, partly from the demands of a rural community where the official school term is sometimes only six months in duration, and partly from the attitude of parents in a group which is not in complete sympathy with American standards.

Educational opportunities have likewise been dissimilar for the two sexes, although at present the environments of men and women are probably more nearly equated in this respect than in any other. Although America was in advance of most other countries in the education of women, until nearly the middle of the nineteenth century there was no institution of collegiate rank in this country which

admitted women. Professional and post-graduate training was not available until a much later date. Even in the elementary and secondary schools, the traditional curriculum for girls was different from that for boys, including much less science and more literature, art, and other "genteel" subjects. Such educational differences are particularly important in the evaluation of the achievements of the sexes in the past as, for example, in comparisons of the relative number of men and women who have achieved eminence in different fields.

The opportunities for intellectual development provided by the home and general cultural milieu in which the individual is reared also exert a marked influence upon intelligence-test performance. The relation between *socio-economic level* and IQ has been repeatedly demonstrated.¹⁶ In general, when children are classified according to the occupational level of their fathers, a difference of about 20 points is found between the average IQ's of the children of professional men and those of the children of unskilled laborers. A number of investigators have employed detailed scales for rating many characteristics of the home environment. Correlations in the vicinity of .40 have usually been obtained between such home ratings and the IQ's of school children.

It is apparent that the socio-economic level of the homes of such groups as immigrants, Negroes, or Indians is, on the whole, far below the general American norm. Both as regards occupational status and as regards the various indices of cultural level of the home, these groups have repeatedly averaged much lower than the native-born white Americans with whom they were compared.¹⁷ It might be argued that we cannot determine which is cause and which is effect in the observed relationship between intellectual and socio-economic level. Since, however, the opportunities for employment in higher positions have been far from equal for native Americans and immigrants, and this difference is still greater when Negroes are considered, it seems unwarranted to attribute the lower occupational status of the latter groups to inferior intelligence. Whatever the explanation, it is certain that the presence of uncontrolled socio-economic differences is a complicating factor in the comparison of racial and national groups.

Language Handicap.—The effect of language handicap upon psychological-test performance has proved to be most serious when this handicap is present in a *mild degree*. Persons with pronounced linguistic difficulty are usually tested with a non-language or performance scale. If the individual has a moderate understanding of English, however, he is quite likely to be tested with the more common and more easily administered verbal tests. Although such an individual may know the language sufficiently well to make himself understood and to follow directions in a test, he may lack the facility in the use of English or the range of vocabulary required to compete fairly on a verbal test. This situation is often met in immigrants who have lived in America for many years, or in the children of immigrants. The latter are frequently *bilingual*, speaking their own language at home and English at school.

That such relatively mild language handicaps may have a pronounced effect upon intelligence-test scores has been repeatedly demonstrated. On such predominantly verbal tests as the Stanford-Binet, National Intelligence Test, and Otis Group Test, an unmistakable tendency is found for those children who speak exclusively English at home to excel the bilinguals.¹⁸ Such differences have been observed among preschool as well as among school children. Moreover, the extent of bilingualism is related to intelligence test performance, the test scores rising with increase in amount of English spoken at home. When children are classified according to country of birth of their parents, a fairly close correspondence is found between the mean IQ of the children and the proportion of parents in the different national groups who have adopted English as the language spoken at home.¹⁹

To be sure, all such correspondences admit of two possible explanations: either the language handicap resulted in lower intelligence-test performance, or the lower intelligence of certain families or national groups prevented their adequate mastery of English. A number of considerations make the former explanation appear more plausible. The closer similarity of some languages to English makes it easier for persons from certain countries to learn English. The reasons for the migrations from different countries may affect the individual's feeling of permanence in America and his motivation

to learn the new language. Similarly, the relative number and distribution of immigrants from the various countries may determine in part whether immigrants will live in communities of their own compatriots or be scattered in predominantly English-speaking neighborhoods.

The most crucial argument regarding the relation between language handicap and intelligence-test score, however, is provided by the finding that the inferiority of the foreign-speaking individuals is greatly diminished and may disappear entirely when non-language tests are employed. With such tests as the Pintner Non-Language, Army Beta, Pintner-Paterson Performance Scale, and Arthur Performance Scale, many investigators have found little or no inferiority in the same bilingual subjects who fell below the American norm on the verbal type of tests.²⁰ It should be noted that such findings have been obtained, not only with children of European immigrants, but also with American Indians and Oriental groups tested in America.²¹ A further relevant fact, brought out in an investigation on American-born Japanese school children in California, was the correlation of .87 between degree of Japanese inferiority on each of the tests of the Stanford-Binet and the "verbality" of the test as estimated by a consensus rating of the tests by seven psychologists.²²

The Criterion of "Intellectual Superiority."—In all group comparisons there is a tendency to go beyond the observed differences in behavior and to evaluate the *relative status* of each group in terms of some presumably universal criterion. Linear comparisons are made in terms of better or worse. Thus we frequently find national or racial groups arranged in a rank-order for "intelligence." Such a point of view implies either that one group is consistently poorer than another in all mental traits, or that certain behavioral processes are universally more significant, more valuable, or even more "mental" than others.

In regard to the first of these assumptions, it can easily be shown that groups vary in the relative inferiority or superiority which they manifest in different traits. Comparison of scores on different types of intelligence scales, or on different tests within a single scale, has repeatedly demonstrated the specificity of such group differences.²³

It has frequently been argued, however, that racial or national groups can be arranged in a consistent hierarchy if we consider only the "higher mental processes." Tests of abstract abilities, for example, are considered more diagnostic of "intelligence" than those dealing with the manipulation of concrete objects or with the perception of spatial relationships. The aptitude for dealing with symbolical materials, especially of a verbal or numerical nature, is regarded as the acme of intellectual attainment. The "primitive" man's skill in responding to very slight sensory cues, his talents in the construction of objects, or the powers of sustained attention and muscular control which he may display in his hunting behavior, are regarded as interesting anthropological curios which have, however, little or no intellectual worth. As a result, such activities have not usually been incorporated in intelligence scales, but have been relegated to a relatively minor position in mental testing.

Upon closer examination, it will become apparent that this conception of intelligence is itself culturally conditioned. By "higher mental processes" is usually meant those aspects or segments of behavior which are at a premium in our society. Intelligence tests would be very different if they had been constructed among American Indians or Australian aborigines rather than in American cities. There are a few instances on record of the application of a test constructed from the point of view of some other culture. Porteus,²⁴ for example, having been impressed with the remarkable tracking skill of the Australian aborigines, constructed a test with photographs of footprints, the task being to match the two prints made by the same foot. On this test, the Australians did practically as well as a group of 120 white high school students in Hawaii, despite the probable advantage given the latter by the use of paper-and-pencil materials. Similar results were obtained with a Draw-a-horse test, patterned closely on the Goodenough Draw-a-man test and standardized on Pueblo Indian children.²⁵ In terms of age-grade placement and other criteria of "intelligence," the "horse" test proved to be more valid than the "man" test for these children. Moreover, when both tests were given to white and Indian children, the whites excelled on the man-drawing test and the Indians on the horse-drawing test. On

the basis of the latter test, the 11-year-old white boys tested in this study would have obtained a mean "IQ" of 74!

The criterion employed in validating intelligence tests has nearly always been success in our social system. Scores on the test are correlated with school achievement or perhaps with some more general measure of success in our society. If such correlations are high, it is concluded that the test is a good measure of "intelligence." The age criterion is based upon the same principle. If scores on a given test show a progressive increase with age, it may merely mean that the test is measuring those traits which our culture fosters in the individual's development. The older the subject, the more opportunity he will have had, in general, to develop such aptitudes.

Thus it would seem that intelligence tests measure only the ability to succeed in our particular culture. Each culture, partly through the physical conditions of its environment and partly through social tradition, "selects" certain activities as the most significant. These it encourages and stimulates; others it neglects or definitely suppresses. The relative standing of different cultural groups in "intelligence" is a function of the traits included under the concept of intelligence or, to state the same point differently, it is a function of the particular culture in which the test was constructed.

SEX DIFFERENCES

In view of many of the problems which have been discussed in the preceding sections, it would seem difficult to formulate any summary statements regarding sex differences from the data of a number of independent investigations. This is especially true since such investigations differ widely in number and kind of subjects, specific tests or materials employed, and other important conditions. Similarly, a number of studies fail to report reliabilities, degree of overlapping, and other essential facts, thus making it difficult to evaluate their findings. Under these conditions, the most common available criterion for the acceptance of a conclusion is the *consistency* of results of different investigators. It should also be remembered that such findings represent only sex differences under existing conditions

in our society. Although of limited application, however, such data are not without practical value.

Intellectual Aptitudes.—Any comparisons of the sexes on total intelligence test scores are likely to yield ambiguous results, since females excel in certain aptitudes and males excel in others. Consequently, in an intelligence test composed of heterogeneous tasks, the sex differences will either tend to cancel out, or one or the other sex will excel, depending upon the predominance of one or another type of function in the particular test. Moreover, in the construction of current intelligence tests, an effort is usually made to exclude those tasks which favor either sex unduly.²⁶ It is thus apparent that intelligence tests, and especially total scores on such tests, are singularly unsuited to the discovery of sex differences.

As a more fruitful approach, we may turn to a consideration of sex differences in special aptitudes. Some relevant information can be found in the analysis of the subtest scores of many intelligence tests. A considerable body of data has been directly accumulated, however, with tests designed to measure verbal, numerical, spatial, and other relatively independent aptitudes.²⁷ A difference in favor of the male has been repeatedly observed in various phases of *spatial* and *mechanical* aptitudes. The possibility that this difference has a predominantly cultural basis, however, is suggested by the fact that male superiority is greater and more consistent in tests calling for mechanical information than in the more abstract tests of spatial relations which may be equally unfamiliar to both sexes.²⁸ Moreover, the sex difference in this area does not appear as early in life as do differences in other aptitudes.

Among school age children and adults, males excel on the average in such tests as form boards, puzzle boxes, mazes, construction tests, and most of the tests included in performance scales of "intelligence." Consistent male superiority is also found in assembly tests, in which common objects, such as bottle stopper or spark plug, are to be put together from given parts. Especially marked is the superiority of men on tests of mechanical comprehension.²⁹ On the other hand, women excel in such tests as block packing, card sorting, finger dexterity, and tweezer dexterity, all involving fine manual dexterity com-

bined with the perception of spatial details. Such a sex difference was especially apparent during World War II, when women were assigned to assembly, inspection, and similar industrial operations.

On *numerical reasoning* tests, most differences again favor boys, although these differences likewise fail to appear until the children are well into the elementary school period. On the Stanford-Binet, boys excel significantly on tests of arithmetic reasoning, ingenuity (a more difficult type of numerical reasoning problem), and induction (in which a generalized numerical rule must be found).³⁰ On group tests of intelligence, boys are generally superior in tests of arithmetic reasoning and number series completion. As an example may be cited the highly significant differences in mean scores found in favor of males on the Quantitative part of the American Council Psychological Examination.³¹ This test is given annually to many thousands of entering college freshmen. Its Quantitative score (Q-score) is based on tests of arithmetic reasoning, number series completion, and figure analogies, the last-named being a predominantly spatial test.

In tests of speed and accuracy of *computation*, the differences usually favor girls. This difference is probably related also to the commonly observed female superiority in *clerical aptitude* tests. For example, in the norms reported for the Minnesota Clerical Test, only about 16 per cent of male workers in the general population reached or exceeded the median of female workers.³² This test requires the checking of similarities and differences in lists of names and numbers. In all these functions, a female superiority in speed and accuracy of perceiving details may be involved, as was also suggested by the results on some of the manual dexterity tests discussed above.

In *verbal*, or linguistic, aptitudes, there is a fairly consistent difference in favor of the female, which is manifested at an early age and persists throughout life. Observations on normal as well as on feeble-minded and gifted children have shown that, on the average, girls begin to talk earlier than boys.³³ Similarly, girls of preschool age have a larger vocabulary than boys. At all ages, speech disorders and reading disabilities are less frequent among girls. Female superiority has been found consistently in such tests as speed of reading, naming opposites, analogies, sentence completion, disarranged sentences, learning an artificial language, and code-learning. The dif-

ference in favor of girls noted in many of the common paper-and-pencil tests of "intelligence" may likewise be attributed to the large verbal content of such tests.

On most tests of *memory*, a sex difference in favor of the female has likewise been found. As in the case of verbal ability, these differences have been found from preschool age and persist throughout life. The female superiority in memory has been established with a wide range of materials and methods of testing retention, and for direct as well as incidental memory. In this connection may also be mentioned the fact that women tend to have more vivid mental imagery than men in every sense modality. This finding, first suggested by Galton on the basis of his famous "breakfast table" questionnaire, has been subsequently corroborated by a number of investigators.

It is interesting to note that in *scholastic achievement*, girls tend to surpass boys, even in those subjects which should favor the boys. Achievement-test scores show the boys to be somewhat superior in such fields as arithmetic, geometry, science, and history, the girls excelling in reading and language usage. In school grades, however, girls excel consistently in nearly all subjects. Girls are also promoted in larger numbers and are more often accelerated and less often retarded than boys. Among the explanations for these discrepancies might be mentioned the important part which verbal ability plays in all school instruction and especially in examinations. A further explanation can probably be found in personality factors, such as the greater neatness and docility of the girls, and the fact that they are more susceptible to school discipline and less frequently constitute "behavior problems" than boys.

Personality Traits.—A number of investigations with personality inventories, most of which have been conducted on adults, report a sex difference in *emotional traits*. Typical of the results of such studies are those obtained with the Bernreuter Personality Inventory.³⁴ On this test, men were found to be significantly more stable, or less neurotic, more self-sufficient, less introverted, more dominant, and more self-confident than women. In a more intensive investigation of introversion among college students, no significant sex differ-

ence was found in the introversion-extroversion variable itself, but a difference was noted in another trait which apparently cut across introversion-extroversion.³⁵ This trait seemed to be concerned with social relations. The introvert characteristics most often found among men were those which would interfere with social adjustment, such as keeping in the background on social occasions, and being outspoken. Those most often found among women were such as to interfere with efficient work, such as shrinking when facing a crisis, or working by fits and starts.

It is interesting to note that neurotic inventories administered to younger groups generally show no significant sex difference below the age of fourteen.³⁶ Such a finding suggests the possible influence of an increasing cultural differentiation in the environments of the two sexes with age, and especially in the social pressures following puberty. Sex differences in certain other personality characteristics, however, have been observed consistently on subjects ranging from nursery school children to college students and older adults, and with a variety of methods, including case histories, direct observation of behavior samples, reports of teachers and parents, interviews, questionnaires, and tests. Among the most conspicuous of such differences are a greater tendency toward *aggressiveness* and toward *vigorous motor activity* in the male; and a stronger *social orientation* in the female. The latter is manifested, for example, by a greater interest in people, concern for social prestige, worry about manners and appearance, jealousy, and fear of being alone.³⁷

The administration of *character tests* to children of both sexes has revealed no consistent difference in honesty, a slight tendency for girls to be more cooperative and more persistent, and a larger and statistically significant difference in inhibition in favor of the girls.³⁸ In *interests* and *attitudes*, marked sex differences are found at all age levels in our society, although even in these traits the overlapping of the two groups is large and many individual exceptions can be found. Typical of such findings are those obtained with the Allport-Vernon "Study of Values." Among women, the highest average values on this test fall into the aesthetic, social, and religious categories; among men, they fall into the theoretical, economic, and political.³⁹ Such findings are, of course, understandable in the light

of the differing traditions and social expectancy of the two sexes in our society.

A comprehensive approach to the problem of sex differences in personality traits is represented by the "Interest-Attitude Analysis" prepared by Terman and Miles.⁴⁰ This consists of a battery of tests designed to differentiate as clearly as possible between the characteristic male and female patterns of response and thus furnish an index of "masculinity-femininity." After an exhaustive survey of the literature and prolonged research, items were selected which revealed the most pronounced differences between representative samplings of the two sexes in our society. Data were collected on many hundreds of subjects, including elementary, high school, college, and graduate students, unselected adults, members of several occupations, and specially selected groups such as athletes, juvenile delinquents, and adult homosexuals. The scale as a whole proved very successful in differentiating between the responses of groups of men and women in our society.

At the same time, the masculinity-femininity index was found to be related to such experiential factors as education, occupation, and domestic milieu. For example, such conditions as the predominance of brothers or sisters among the siblings, death of one parent, and excessive or exclusive association with one or the other parent, were much more closely associated with the masculinity-femininity index than were physical traits. Women of high intellectual and educational level tended to score more "masculine" than their sex norms. Similarly, "cultured" men, that is, men who had cultivated avocational interests of an artistic or intellectual sort, tended to test more "feminine." Thus the equalizing influence of specific training or experience in the two cases seemed to bring about a convergence of the temperamental qualities of the two sexes.

Sex Differences and Culture.—The study of the typical behavior characteristics of the two sexes in different cultures offers interesting possibilities for the analysis of the origin of such differences. A predominantly biological or hereditary determination of sex differences would imply the existence of a *universal pattern* of male and female behavior. If sex differences in behavior are environ-

mentally determined, on the other hand, we should expect the traditional behavior characteristics of each sex to vary from one culture to another. Data on this question are still relatively meager. Psychologists have made relatively little use of the wealth of information offered by the comparative study of behavior phenomena in different cultural milieus.

Certain observations reported by anthropologists, however, offer suggestive material on this problem. Mead, for example, observed the traditional emotional characteristics of men and women in three primitive societies, each of which presents a different pattern of male and female personality.⁴¹ Among the *Arapesh*, both men and women display emotional characteristics which in our society would be considered distinctly feminine. In this group, both sexes are trained to be cooperative, unaggressive, gentle, noncompetitive, and responsive to the needs of others. Among the *Mundugumur*, on the other hand, both men and women are violent, aggressive, ruthless, and competitive. Both sexes take great pleasure in action and in fighting. Perhaps the most interesting pattern is presented by the *Tchambuli*, among whom there is reported to be a genuine reversal of the sex-attitudes of our culture. In this group the women are impersonal, practical, and efficient. The men are artistic, graceful, emotionally subservient, timid, sensitive to the opinions of others, and throughout their lives dependent upon the security afforded to them by the women. A clue to the understanding of these widely differing patterns of male and female behavior is furnished by the social and economic organizations and other cultural traditions of the three groups.

The Role of Physiological Factors.—Large sex differences have been found in nearly every physical characteristic, including body build, gross and fine anatomy, physiological functioning, and biochemical composition.⁴² It is possible that differences in height, weight, body build, muscular strength, and vital capacity * may account in part for the greater tendency toward dominance, aggression,

* Vital capacity is the total volume of air exhaled after a maximal inhalation. The vital index $\left(\frac{\text{vital capacity}}{\text{body weight}} \right)$ is also higher in the male at all ages.

and general muscular reactivity found in the male from an early age. Vital capacity has been considered especially significant since it is a determiner of sustained energy expenditure. Male superiority in vital capacity averages approximately 7 per cent at age 6, 10-12 per cent at age 10, and 35 per cent at age 20. It has been suggested that this difference may be one of the factors underlying sex differences in play interests, liking for activity and adventure, and relative achievement in a number of fields. Similarly, the superior mechanical aptitude found in males may be traceable in part to a greater facility in the manipulation of mechanical objects because of sex differences in strength and body build.

Other sex differences in physical characteristics which may have a bearing upon behavior development have been noted. The more rapid *rate of maturation* of the female has already been mentioned. The female appears also to have a greater *viability*, or capacity to maintain life. Thus the frequency of stillbirths and miscarriages is much greater among male infants. Similarly, females show more resistance to most infectious diseases and a lower death rate at all ages. A further sex difference is in the *stability of many bodily functions*, homeostatic mechanisms apparently operating within narrower limits in the male than in the female. Males on the whole show less fluctuation in such characteristics as body temperature, basal metabolism, acid-base balance of the blood, and level of blood sugar. The greater proneness of women to flushing and fainting, as well as the greater frequency of most glandular imbalances in the female, may be related to such sex differences in homeostasis.

It is possible that the greater fluctuation of certain bodily functions in women may contribute to the development of certain differences in emotionality, neurotic behavior, and the like. Similarly, the sex differences in rate of maturation and in viability could conceivably affect behavior development either directly or indirectly. For example, an excess in the proportion of women at any one age level, or the fact that girls reach sexual maturity earlier than boys, when they are therefore psychologically more immature, might have cultural consequences which could in turn influence the personality development of the two sexes.

In any discussion of physiological factors in behavior, it is important to guard against over-generalization and reasoning by analogy. It is, for example, possible to find exceptions to the principle of greater male stability in bodily functions. Moreover, one cannot assume sex differences in "psychological homeostasis" by analogy with physiological homeostasis. It is undoubtedly true that a combination of many biological and cultural factors is at the basis of sex differences in behavior. Nearly all observations on complex behavior characteristics have been made on groups in which cultural conditions were not the same for men and women and hence environmental influences were not ruled out. It is probable that biological differences would produce some sex differences in psychological characteristics even under identical environmental conditions. At the same time, it should be recognized that environmental conditions can sufficiently counteract biological influences as to produce a reversal of the behavior characteristics of the two sexes in individuals or in groups. Finally, whether biologically or culturally determined, the extensive *overlapping* between the distributions of any behavior characteristic in the two sexes cannot be overlooked.

"RACIAL" AND NATIONAL DIFFERENCES

The Concept and Criteria of Race.—The classification of men into racial groups is essentially a biological one and corresponds to such divisions as breed, stock, and strain in infrahuman organisms. In its simplest terms, any definition of race implies a certain community of physical characteristics based primarily upon a common heredity. The task of classifying individuals into races is far more difficult and complex than would appear from the glibness with which individuals are commonly assigned to one group or another. The essential problem in the classification of racial groups consists in the identification of inheritable physical characteristics which differ clearly from one group to another and which may thus serve as *criteria* of race. A wide variety of such criteria have been proposed and investigated by anthropologists, including skin color, pigmentation of the eyes, hair color and texture, gross bodily dimensions,

facial and cranial measures and indices, blood groupings, endocrine activity, and constitutional type.

In the application of any of these racial criteria, a number of difficulties are encountered. In the first place, wide *variability* exists within any one racial group in any of these characteristics. Closely related to this is the extensive *overlapping* between different groups in any of the proposed criteria. A third difficulty is the *inconsistency* which is frequently found when more than one criterion is employed. An individual might thus have the coloring of one racial group, the cephalic index * of a second, and the stature of a third. Finally, it should be noted that many of the alleged racial characteristics which were formerly accepted as innate have proved to be *unstable* and susceptible to environmental influences. Even such apparently "hereditary" traits as body height, skull shape, and facial conformation have been shown to be dependent in part upon stimulating conditions in early childhood.⁴³

It should thus be borne in mind that at best any racial classification is approximate. No sharp line of demarcation can be established between groups, nor can any individual be unequivocally assigned to one particular group. The classification which is most widely accepted at present is one which is based upon a combination of criteria, chief among which are cephalic index, hair quality, hairiness on the body, facial conformation, and bodily proportions. The major racial divisions in this classification are as follows: (1) Caucasian, including Nordic, Alpine, Mediterranean, and Hindu; (2) Mongoloid, including Mongolian, Malaysian, and American Indian; (3) Negroid, including Negro, Melanesian, Pygmy Black, and Bushman; and (4) doubtful, including a number of small, scattered groups which cannot be assigned to any of the three major divisions.⁴⁴

The discussion of race differences is further complicated by the common confusion of racial categories with *nationality* and with *linguistic groupings*, such as "Latin" or "Aryan." The extensive amount of *race mixture* which has gone on for many generations also adds to the difficulty of classifying the individual into a particular racial group. Psychological investigators, furthermore, have often

* The cephalic index is one of the most common indices of race and is found by dividing head width by head length and multiplying the quotient by 100.

chosen their subjects on the basis of accessibility, and have only infrequently attempted a systematic classification into racial categories. In the sections which follow, some of the most representative findings will be reported for each of the three major racial groups.

The Negroid.—The large majority of investigations on the Negroid race have employed the American Negro.⁴⁵ On most intelligence scales, Negroes have generally obtained lower average scores than whites. There is some evidence to suggest that on tests which emphasize speed and on those with a predominantly verbal content, Negroes make a relatively poorer showing. The major difficulty in any comparisons between American Negroes and whites, however, arises from the large, uncontrolled differences between these two groups in such factors as socio-economic level, educational opportunities, social expectancy, and social attitudes. When environmental differences are so great, it is impossible to determine what contribution, if any, racial or biological factors may make to the observed differences in tested abilities. A few investigations on special groups of Negroes and whites living under more nearly comparable conditions still found significant differences in average intelligence test scores.⁴⁶ Even in these studies, however, the groups could scarcely be considered comparable, since a number of important uncontrolled factors remained.⁴⁷ At the same time, some data are available which suggest that under more favorable socio-economic conditions, the test performance of Negro children will improve.⁴⁸

One of the most outstanding findings of Negro testing has been the large *regional differences* in score within the Negro samplings. Especially large are the differences between northern and southern states. These differences were first vividly demonstrated by the Army Alpha scores obtained during World War I. The median scores of white, northern Negro, and southern Negro draft were 58.9, 38.6, and 12.4, respectively.⁴⁹ Large regional differences were likewise found among the Negro samplings tested during World War II.⁵⁰ Moreover, the rank order of different regions in mean test scores were closely similar for Negroes and whites. Similar differences have been found in comparisons of Negro school children in northern and southern states. In some localities, the mean

IQ of Negro children reaches or exceeds 100; in others, it may be in the 80's or even 70's.⁵¹ Equally conspicuous regional differences have been found in the intelligence test scores of college students. Thus when 253 Negro freshmen in a single college were classified with respect to northern or southern origin, large and significant differences were obtained in mean score on the American Council Psychological Examination.⁵² These regional differences persisted, moreover, when comparisons were made between groups matched in parental occupation.

That these differences are the result not of *selective migration* but of the difference in *environmental stimulation* to which northern and southern Negroes are exposed was suggested in a series of investigations by Klineberg.⁵³ In the first place, southern Negro children who had migrated to the north with their families were found not to have been above average in their scholastic achievement in southern schools before migration. In the second place, the comparison of average intelligence-test scores of Negro children who had lived in New York City for varying periods of time showed a progressive increase with length of residence in New York.

A further fact in support of an environmental hypothesis of Negro-white differences in intelligence test performance is the lack of relationship between intelligence test score and *degree of Negro-white mixture*. When Negro children have been classified on the basis of objective physical criteria or genealogical data, the correlations between intelligence test scores and degree of white mixture have been consistently low and unreliable.⁵⁴ It should also be noted in this connection that a search for Negro children with IQ's of 125 or higher revealed a range extending up to 200, which corresponds approximately to the highest IQ found among white children. In this superior group, too, no tendency was found for the higher scores to be obtained by those with a greater proportion of white ancestry.⁵⁵

In regard to “*nonintellectual*” traits, no reliable differences have been established between Negro and white groups. The groups tested in such studies have usually been small and often highly selected. In certain cases, the conditions under which the tests were administered were not comparable for white and Negro groups. It is also

likely that a number of common personality-test items have a different significance for two groups living under such different social conditions. In reference to the popular belief that the Negro has an "innately superior musical sense," the evidence is quite clearly negative. Repeated surveys with the Seashore Measures of Musical Talent have failed to reveal any consistent or significant Negro-white differences.⁵⁶

The Mongoloid.—Investigations on American Indians, both in the United States and Canada, indicate a poorer performance by the Indian child, in general, on such *verbal tests* as the Otis and the National Intelligence Test.⁵⁷ This inferiority is less marked on the non-language and performance scales, but it usually persists whenever *speed* plays an important part in determining the score. As has been reported above, clear-cut differences are found in the test performance of monolinguals and bilinguals. A fairly close relationship has also been established between socio-economic level or degree of assimilation of white culture and average test score of various Indian groups.⁵⁸

It is interesting to note that on the Goodenough Draw-a-man test, the average Indian IQ is usually as high or higher than that of white children.⁵⁹ Moreover, when groups are chosen which are most nearly comparable to white American children in education, socio-economic status, and use of English, the Indian children show no inferiority even on such tests as the Otis, with its emphasis upon speed and verbal ability.⁶⁰ Within such a group, furthermore, the correlation between degree of white ancestry and intelligence test score is virtually zero.⁶¹ In the comparison of tribal groups which differ markedly in the extent to which they have adopted the white American culture, a spurious relationship between test score and degree of white ancestry may result, since more race mixture has probably occurred in just those groups or individual families which are culturally more assimilated.⁶²

In an extensive investigation on American-born Japanese, 570 Japanese children between the ages of 10 and 15 were given the Stanford-Binet and the Army Beta, as well as tests of school achievement.⁶³ On both scales, the Japanese children excelled the white

children in those tests which involved *sustained attention and visual perception*. Thus on the Army Beta, there was a statistically significant difference in favor of the Japanese children in digit-symbol substitution and in number comparisons, and a smaller difference in the same direction in cube analysis and geometric construction. The picture completion test, which is obviously dependent upon environmental background, was the only test in the scale in which the Japanese children were significantly inferior. On the Stanford-Binet, the Japanese children were significantly superior in four tests: induction, paper cutting, enclosed boxes, and code. Their inferiority on the verbal tests was sufficient, however, to pull down their total score, the median IQ of the Japanese children being 10 points lower than that of white children in the same districts.

In an investigation in which the Pintner-Paterson Performance Scale was administered to 500 Japanese and Chinese children in the public schools of Vancouver, both groups obtained a higher average IQ than white children, the Japanese obtaining a higher average than the Chinese children.⁶⁴ One could easily speculate upon the special traditions and cultural factors which might account for the superiority of these Oriental groups in certain types of tests.

The Caucasian.—Psychological investigations on racial subgroups within the Caucasian group have been conducted largely with immigrants in the United States, and are therefore limited in the scope of their findings. In addition to the operation of selective factors, which have been discussed above, the adjustment to life in a new culture, with its attendant shift of standards and bilingualism, introduces many complicating factors. The frequent confusion of racial and national groups in such studies further complicates their interpretation.

A more fruitful approach is to be found in the *cross-comparison* of national and racial groups within the same sampling. Race is a biological classification, nationality a cultural one. Such cross-comparisons can thus afford an index of the relative contribution of these two classes of factors in the production of behavioral differences. This approach is illustrated in an investigation conducted on 10- to 12-year-old boys in rural sections of Germany, France, and

Italy.⁶⁵ Each of these countries includes more than one of the Caucasian subgroups within its population. In Germany, Nordic and Alpine samplings were obtained; in France, Nordic, Alpine, and Mediterranean; in Italy, Alpine and Mediterranean. The subjects were selected from those geographical areas in which pure types of each race were most likely to be found. Only children who had themselves and whose parents had been born in each particular area were included in the study. The subjects were further selected on the basis of eye color, hair color, and cephalic index so as to fall within the specified limits of the given racial group.

Each subject was examined individually with six of the tests in the Pintner-Paterson Performance Scale, brief oral directions being given in the subject's own language. When the subjects were classified into racial groups, no significant difference in average score was obtained. The differences among the three national groups, on the other hand, were larger and more nearly significant. Marked variation was found, furthermore, within the sampling of a single racial group from one nation to another. The difference between one Nordic group and another, for example, was larger than that between the Nordic and Mediterranean groups as a whole. Such data suggest that there is no basis for an intellectual hierarchy in terms of race, but that cultural factors play the major role in the production of group differences.

THE MULTIPLE GROUP CONCEPT OF INDIVIDUALITY

Nature of a Psychological Group.—Psychologically the individual belongs to every group with which he shares behavior. From this point of view, group membership is to be defined in terms of stimulative value rather than biological categories. The effective grouping is not based upon the individual's race or sex or physical characteristics, but upon his experiential background. Thus if the individual is reared as a member of a certain national group with its own traditions and cultural background and its own peculiar complex of stimulating conditions, he will display the behavioral characteristics of that group regardless of his racial origin. It should be understood, of course, that mere physical presence does not con-

stitute group membership in a psychological sense. Thus if a Negro child were brought up in a community composed exclusively of whites, he would not necessarily receive the same social stimulation as a white child.

Multiplicity of Overlapping Groups.—It follows from such a concept of a psychological group that any one individual is effectively a member of a large and varied set of groups. A multiplicity of behavioral groups, large and small, cut across each other in the individual's experiential background. The individual is born into a broad cultural division such as, for example, "western civilization," with its characteristic sources of stimulation. He will develop certain intellectual aptitudes, emotional traits, attitudes, and beliefs as a result of his affiliation with this group. He is also a member of a given national group with its more specific ways of acting.

If the individual displays certain physical characteristics, such as a particular skin color, facial conformation, or body build, he may be classified as a member of a given "racial" group which occupies a distinct position within the broader national division. In so far as his racial background leads to certain social distinctions and culturally imposed differentiations of behavior, it will indirectly produce an effective grouping. The same may be said of sex. If within a given society traditional beliefs in regard to sex differences exist so that the sexes are exposed to dissimilar psychological stimulation, then the individual's sex will in part indirectly determine his behavioral characteristics.

There are a number of other, less clearly defined, behavioral groupings which may represent important factors in the individual's development. Whether the individual was reared in the city or the country, the particular state or province in which he spent most of his life, and even the specific neighborhood in which he lives, may significantly affect his emotional and intellectual development. Other groups with which the individual identifies himself behaviorally are his occupational class, his religious sect, his political party, his club, his educational institutions, his family, his generation and age group, and his recreational group, such as persons sharing a certain hobby. These groups influence the individual's behavior in two essential

ways. First, they directly stimulate and foster certain ways of acting. Secondly, the reactions of other people to the individual are affected by his group affiliation. The social attitudes and "social expectancy" which the individual encounters as a result of this group membership will in turn influence his behavior.

The Nature of Individuality.—The individual may be regarded as partly a resultant of his multiple group memberships. To be sure, each individual also undergoes experiences which are absolutely unique to himself. Such experiences are probably less significant, however, in shaping the more basic aspects of his personality than is his shared behavior. The types of experiences which are common to a group of individuals have a certain degree of permanence in the sense that they will tend to be repeated more often and to be corroborated or reinforced by other similar experiences. In general, the more highly organized the group, the more consistent and systematic will be the experiences which its members undergo. This will tend to make the shared experiences on the whole more effective than the purely individual ones.

In view of the pronounced effect of such shared or common behavior upon the individual's development, it may appear surprising that individuals are no more alike in their behavior repertory than we ordinarily find them to be. The extent of individual differences within any one group is extremely large. In fact, the variations among individuals have always proved to be more marked than the differences from one group to another. How can the complete "individuality" of each person be explained in terms of his shared experiential background?

The key to this question seems to lie in the *multiplicity* of overlapping groups with which the individual may be behaviorally identified. The number of such groups is so great that the *specific combination* is unique for each individual. Not only will this furnish an experiential basis for the existence of wide individual differences, but it also suggests a mechanism whereby the individual may "rise above" his group. There are many examples of individuals who have broken away from the customs and traditions of their group. Through

such situations, the modification of the group itself may be effected.

In these cases the individual is not reacting contrary to his past experience, as might at first appear. This would be psychologically impossible. His behavior is the result of psychological membership in various conflicting groups. Many group memberships can exist side by side in a composite behavioral adjustment. But in certain cases two or more groups may foster different ways of reacting to the same situation. This enables the individual to become aware of the arbitrariness of the restrictions and traditions of each group, to become critical of them, and to regard them more "objectively." Membership in many unlike groups frees the individual from the intellectual and other limitations of each group and makes possible the fullest development of "individuality."

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CHAPTER XIV

CLINICAL PSYCHOLOGY

By ROBERT I. WATSON, *Washington University School of Medicine**

Psychology has been applied in many areas to the solution of human problems. In the behavior complex which constitutes the interaction of the individual and his environment, optimum or even minimum passable adjustment is often not achieved. Things go awry; either the individual is unhappy, frustrated, at odds with his family, friends, other associates, and society in general, or some of these other individuals find reason to object to his behavior although he personally may be quite satisfied. It is to the consideration of the application of psychology to the problems of individual adjustment that this chapter is devoted.

The focus of attention of the clinician is upon the individual showing need of psychological services. Psychologists, using other approaches, to be sure, concern themselves with individuals, but a difference is found in the attitude taken; the clinical psychologist devotes himself to the problem of helping the individual make as nearly adequate adjustment to life's vicissitudes as possible. The unique make-up of the individual person is the subject matter studied for its own account. The clinician is concerned with the individual for the sake of that individual, to understand him so as to plan what is to be done, and then, either alone or in collaboration with other specialists, teachers, physicians and the like, to help him to carry out the steps necessary to bring about personal adjustment.

In the handling of such problems the psychologist's attitude toward the individual using his services is given concrete form through the application of the clinical method. This way of approach-

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ing the psychological problems of the client or patient through the clinical method may be divided into the two closely related phases of diagnosis (understanding) and treatment (helping).

CLINICAL PROBLEMS

Diagnosis.—In the records of the various clinics and agencies with which clinical psychologists are connected may be found cases of many sorts: The child whose ability is so inadequate that he is called feeble-minded, the adult whose behavior is so “queer” that he has been legally placed in a mental hospital, the adolescent whose inability to decide upon a career results in his request for consultation, the delinquent boy whose antisocial behavior has resulted in his court appearance, the veteran whose war experiences have left him uncertain and afraid, the boy in school who cannot learn to read, the college student who suffers from feelings that he is inferior to his fellows, and so on. It is evident that most of these problems result from some sort of inadequate adaptation; that is, the persons have some difficulty in behaving in ways that are acceptable either to themselves or to society. The primary aim of clinical psychology is to help each individual client to modify his behavior so that it becomes more personally satisfying or more socially acceptable. In order to do this it is first of all necessary to understand in specific detail the nature of the behavior difficulty and to discover the important etiological (causative) factors which have resulted in this behavior. The investigation of an individual's problem behavior, including an unbiased description of the behavior, significant facts in the person's experiential history, his physical and mental condition, and other pertinent facts, constitutes the field of psychological diagnosis. In dealing with some clinical problems, the psychologist finds his task completed in diagnosis; in dealing with others he participates in the treatment phase.

Treatment.—If the ultimate aim of clinical psychology—helping the individual to readjust—is to be successful, someone, psychologist or not, as the case may be, must go further than diagnosis alone, for otherwise the process is sterile. Treatment must be

planned and carried out. The feeble-minded child may need custodial care, the patient in the mental hospital may need a long series of psychotherapeutic sessions, the adolescent without vocational plans may need vocational information specific to his diagnostically determined pattern of abilities and interests, the delinquent boy may need vocational training and removal to an environment where more socially acceptable behavior may be developed, the veteran may need ventilation and understanding of his fears, the nonreader may need specific tutoring in this field, and the college student suffering from an inferiority feeling may need to be taught self-confidence.

Medical, Social, and Educational Aspects.—The precise program to be tried out depends upon understanding not only the individual's behavior and the circumstances of its development, but also the nature of the resources, professional and environmental, that are potentially available. In dealing with such problems as these in both diagnosis and treatment, the psychologist cannot be all things to all men; he must depend upon the cooperation of other professional personnel. The feeble-minded child requires a thorough examination by the physician to determine whether medical treatment would be helpful; the mental-hospital patient may require intensive therapeutic sessions with the psychiatrist; the vocationally indecisive adolescent may require the services of the vocational-information specialist; the delinquent may require the social worker's expert help in appropriate placement in a foster home far removed from the scene of his antisocial behavior; the nervous veteran may gain insight and stability from sessions with the counselor trained to accept him non-judgmentally; the nonreader may require help from a specially trained teacher; the college student with gnawing fears of his own worth may need to be guided by a recreational expert or dean of men into activities that allow his social grace and confidence to develop. General medical practitioner, psychiatrist, vocational specialist, social worker, counselor, teacher, and recreational expert are by no means the only specialists with whom the psychologist shares professional responsibility. The probation officer, the occupational therapist, the speech specialist, and the pediatrician are

other specialists whose work touches upon that of the clinical psychologist. Thus we see that clinical psychology has very definite relations to many fields, especially education, social work, and medicine.

The clinical psychologist occasionally finds or makes for himself a situation in which he conducts activities perhaps indistinguishable from those in which the other experts mentioned above have at least some vested claim. He may conduct intensive therapy, do remedial teaching, or perform practically any of the duties heretofore used as illustrative of the work of other specialists. This is a defensible procedure when he is properly trained for the work. Then, too, the very nature of the task before him, applying scientific knowledge to practical human affairs, makes it necessary to integrate material from several sciences. While the clinical psychologist is trained to take, and should maintain, an objective psychological point of view, it is necessary for him to use material from other fields—for example, sociology, education, or the medical sciences—to help in solving the problems he meets. In this chapter we shall be more concerned with the psychological contributions to the study of behavior problems, but we must not lose sight of necessary cooperation among different professional groups.

METHODS

Diagnostic Methods.—The aim of psychological diagnostic methods is an understanding of the patient's present behavioral status, by an adequate sampling of his past history and present performance in order to reach a diagnostic formulation, which in turn is both a basis for prognosis, or estimate of the most probable future course, and a means whereby appropriate treatment procedures may be selected. In order to realize these aims information must be secured in the following four major areas:

- (1) Present behavioral description.
- (2) Physical and psychobiological history and status.
- (3) Psychosocial history and status.
- (4) Behavioral samplings.

The amount of information or the degree of its completeness required in each of these areas will vary from case to case depending upon its nature. For example, mental deficiency may be diagnosed with some degree of assurance on the basis of behavioral samplings in the form of psychometric tests, but verification through physical and social history may be desirable. The purpose of the diagnosis also influences completeness and relative emphasis, as well as the psychologist's share in the task. Examination for the purpose of considering whether or not a child should be given special tutoring in reading will require a different emphasis from that wherein a severe personality disorder is so psychically crippling that a veteran is unable to work. Nevertheless, there is enough essential similarity to permit general discussion.

(1) *Present Behavioral Description.*—The obvious starting point in the diagnostic phase of a psychological case study is the complaint. Why did the individual come to the agency, clinic, or institution, or why was he referred to it by parent, teacher, social worker, court official, or someone else? The reason given in the referral may be the fact that he is not doing well in his first-grade school work; the presence of fears that the Masons are trying to murder him; the dislike of the liberal arts course being pursued; the robbery of the neighborhood candy store; the inability to hold a job because of nervousness; truancy from school; or an attempt to commit suicide. In such instances as these there is a curious mixture of causes and effects, relevancies and irrelevancies, facts and inferences. Very frequently the reason given for the referral may not adequately represent the real problem. Thus "not doing well in school" may be described in many ways. The child may be two or three years over age for his grade; he may be receiving average grades, but the teacher complains of his lack of application; the parents may have set standards of A or B grades and are dissatisfied with the boy because of the C's on his report card. Although many other illustrations might be offered, it could be generalized that every complaint should be substantiated by specific examples. Careful separation of fact and interpretation must always be kept in mind.

Inability to hold a job is a fact; that nervousness is the cause is an inference.

Does the complained-of behavior occur in all situations or only at home, only in school, or only elsewhere? Does the child steal only money, or food, or both? Does he have difficulty only with reading, or with arithmetic as well? Does he play only with younger children? Does he bully the younger children, but avoid older ones? What are some specific examples of his disobedience? These questions illustrate the sort of details that must be known in order to secure a description of present behavior.

(2) *Physical and Psychobiological History and Status.*—Psychological behavior is the behavior of a biological organism. Therefore, the physical condition of the organism is always a possible reason for behavior difficulty. In every diagnostic study it is necessary to take the physical conditions into account. Of course the medical examination which is necessary to determine physical condition is exclusively the task of the physician. Although the psychologist need not be a physician himself, he should be sufficiently acquainted with medical matters to integrate intelligently the physician's findings into the total case history.

Certain items of behavior involve physical maturation as well as training and experience. Thus the development of such activities as walking, talking, control of elimination and so on, depend upon both psychological and biological factors. Since there is relative uniformity of development in different children, certain normative ages are established at which these acts appear. Thus ascertaining the ages at which they occur offers clues to help in interpreting the individual's behavior. If the majority of the behavior patterns occur at a late age, one is immediately suspicious of a general behavioral retardation, indicating feeble-mindedness or borderline ability. Inconsistency in retardation may reflect parental attitudes or abilities. For example, late establishment of elimination control may mean that the mother made no effort to train the child because of her fear of tiring him, or because of ignorance or lack of interest in establishing such control.

Certain forms of physical illness are of considerable importance in properly interpreting the behavior of the individual. One of these areas is general vitality, that is, the adequacy of general physical status. Malnutrition, tuberculosis, and cardiac conditions are relevant here because they reduce the subject's activity and effort. In turn, his achievement and the adjustments dependent upon it are decreased. Crippled conditions—whether due to neural, muscular, or bone and joint pathologies—disturb the normality of action and in this way directly affect the patient's behavior and attitudes. Neurological pathologies are traditionally thought to be uniquely related to behavior pathologies. Endocrine disorders are also important to behavior. The cretin, with his extreme hypothyroidism, is usually feeble-minded. On the other hand, the hyperthyroid individual is more active and more irritable than the normal. Lastly, sensory defects, especially in vision and hearing, are important causes of poor school adjustment in children, and of occupational difficulties in adults.

(3) *Psychosocial History and Status*.—The patterns of behavior, the attitude, the outlook on life of every individual are specifically determined by the interactions of that individual with his environmental conditions. This is, therefore, another large area that we must know about before we can understand the person's behavior. Every individual interacts with a variety of social groups and inanimate physical conditions. In infancy and early childhood the family is the most important of such groups; with increasing age the neighborhood, school, gangs, occupational and recreation groups, and so on, become increasingly important. Depending upon the age of the client and the nature of his problem, information in some or all of these directions is necessary.

For children, the family is the fundamental social group. At the time he is being studied, each child (excluding for the moment children in institutions) is a member of a family. The family, however, is not merely the father, mother, and siblings, but psychologically must include the emotional and intellectual attachments and relations between them; that is, the family is a dynamic, not a static, body.

The child is affected by the attitudes and behavior of his parents toward each other and toward him, but no less are the parents affected by the child and his relations to his siblings. Therefore, not only must we know who are members of the family group (not forgetting relatives or servants who live in intimate contact with the home), but also we must secure some idea of the relations among them. For example, do parents love and respect each other? Does one dominate the other? What are their attitudes toward all the children or toward this particular child? Is he favored or neglected? Are his siblings older or younger? What are their ages and sex? How do the children react to one another? A host of such questions immediately spring to mind, the answers to which are necessary to a full understanding of the child.

The economic condition of the family and the physical nature of the client's home may be indicative. The stealing of a boy who comes from a poverty-stricken home is a very different problem, even a different kind of behavior, from that of the spoiled son of wealth. Economic inadequacy means a greater worry and strain which colors all the family relations. On the other hand, economic plenty may mean an overabundance which stifles independence and resourcefulness. There is evidence to show that among the poor, behavior problems more frequently are of the conduct type—that is, they tend to be socially disturbing; among wealthy families the problems are of the personality type—that is, they are inhibiting to the development of full maturity.

With increasing age the other aspects of the environment assume greater importance. From the day of the preschool child's first excursion a block away from home and his meeting with other children to the day of his death, the requirements of the neighborhood and community, physical and social, constantly make demands upon the individual. The child in school has adjustments to make to the school regulations, the teacher, and other children. The adolescent must adjust himself not only to the school and college, but also to the group pressures from his gang or crowd. The adult has his particular problems at his work, in his church or club, with his neigh-

bors, and so on. In each case the static, physical nature of the environment is of importance. But of greater consequence are the dynamic relations between the individual and the group. Does the teacher like or dislike the child? Does the child play agreeably with the other children? Is this adolescent accepted by his group? Does this adult complain about his boss or fellow-workers? Here again are a host of questions that must be answered if we are to gain an adequate conception of the factors that may be influencing the client's behavior.

While the present social situation in which the client is living is important to his behavior, the influences of his past social interactions are of greater cumulative significance. For this reason information concerning experiential history or reactional biography is necessary. Ideally we should like to have a detailed day-by-day account of the client's experiences. This is, of course, impossible, but records of specific events and relations will be helpful.

A few paragraphs above we called attention to the importance of the conditions in the child's home. While the home situation at the time of examination is important, the cumulative effect of past conditions is probably of even greater significance. For example, the way the child was treated in infancy may be reflected in his present feeling of security or insecurity. Serious changes in the dynamics of the family—a new sibling, death of a father or mother, divorce, or the introduction of a step-parent—may have had a serious influence on the subject's attitudes and behavior. Emotion-provoking situations, such a frightening experience or the constant thwarting of desires giving rise to anger, may now be forgotten, but their influence remains evident in behavior patterns.

In the direction of academic or vocational achievement, the effects of formal educational experiences are important. It is necessary to know about the individual's school history—including not only formal achievement records but also his success in adjusting to the teachers and other children. For adolescents and adults an account of vocational experiences will be significant. In short, no item of the subject's life experience is entirely foreign to our needs.

While a bare recital of informational items in the experiential history would become tiresome, a general principle will suggest its own details. Each subject is a biological organism in constant interaction with its environment. The cumulative effect of interactions determines the nature of his behavior patterns. Sometimes the interactions directly produce behavior, as when a person learns a foreign language or learns to steal. On the other hand the demands of the immediate situation may conflict with previously learned behavior or attitudes, or they may lead to behavior which is socially taboo. In such cases there is emotional conflict, and the subject exhibits behavior which is symptomatic of the conflict: He may try to run away from it; he may compensate for it; he may repress it, and so on. In any case it is necessary to learn the factors in the reactional biography which are of possible significance in the development of the behavior about which we are concerned.

As we can never know *a priori* what experiences are of particular importance in a specific case, it is a fundamental diagnostic problem to discover many experiences. Those of infancy and early childhood in the home are always important; at later ages the experiences in school, with other children or adults, recreational and vocational events, all should be investigated. Environmental pressures lasting over long periods are probably of greater significance than unique events, but the latter should not be neglected. From an extensive record of life experiences the various items must be evaluated in connection with the special problem of the specific individual.

Aside from the physical examination, the collection of most of the material heretofore considered is conducted by means of the interview—a conversation with a purpose, as someone defined it. Varying from almost casual conversation to a much more systematic series of questions and answers according to the phases of the case study in question and to the nature of the clinician-client relationship, the interview is the basic technique used. However, these areas of inquiry are open both to verification of many of the inferences drawn from the interview data and to the elucidation of new material by means of behavior samplings in the form of psychological tests.

(4) *Behavior Samplings*.—A psychological test is a means of sampling an individual's behavior in a standard situation.¹ A patient or client given a psychological test is provided with a means of showing what he does when faced with a certain carefully standardized situation. The individual test as distinguished from the group test is most often used in the clinical situation because of the greater richness of personal observation possible when a single examinee is studied by the clinician. Either group or individual tests permit the derivation of a variety of numerical scores, but in this process we should not let the apparent abstraction of these scores blind us to the fact that it was certain ways in which the person behaved that made the scores possible. *How* he did it is often as important as the correctness or incorrectness of the answer. Indeed, some tests, especially those devoted to the study of attitudes, interests and personality, cannot be said to have right or wrong answers.

It might be best, however, to consider first the tests where the derivation of scores are of relatively greater importance. Intelligence tests fall into this category. Since, for present purposes, intelligence can be taken to be composed of the abilities which are measured by certain tests, attention will now be directed to the tests themselves.

All intelligence tests present certain tasks to the subject. He is required to do as many tasks as well as he can. The tasks may require understanding and use of language as in the well-known Binet² test, or they may require manual performance based upon insight into the task as in form boards, picture-completion tests, and mazes.³ Regardless of the kind of performance required, the subject's success is compared with norms based upon the results from large unselected groups of children or adults. The scores on the tests are computed on all-or-none passes and failures, time, errors, or according to a point system. They are usually expressed in terms of a performance age or mental age. This means that if the child has a mental age of seven years, his performance is equivalent to the average performance of seven-year-olds. This mental age in itself is not very meaningful unless we know how old our subject is. For example, a performance age of seven years would mean very different things in

a five-year-old and twenty-year-old. In order to express this relation easily, the ratio between the two values, that is,

$$\frac{MA}{CA} \times 100 = IQ$$

has been widely used. It is evident from this formula that the intelligence quotient, IQ, is the percentage of the expected performance that the person actually earns.

During the past twenty years the IQ has become a common term in the English language. This is unfortunate because it implies a significance which the ratio does not actually possess. In the first place IQ's or the performance ages from two or three different tests may be numerically quite different and have quite different meanings. Furthermore, the obtained IQ may have been influenced by conditions of the subject or the examiner purely extraneous to the subject's performance ability. Poor health, emotional disturbances, fear of the examiner, carelessness on the part of the examiner, and many other things may operate to lower the performance score. The IQ's are not foolproof values and are meaningful only when interpreted cautiously in the light of all information available.

If one keeps in mind that IQ's or other expressions of test performance, are not absolute measures, they may be extremely valuable. Experience and experiments have shown that there is a significant relationship between performance on a test like the Binet and school achievement. Therefore, low test performance may explain poor achievement and give some basis for prediction of future school and even occupational achievement. A comparison of the performances on language and manipulative tests may indicate strengths and weaknesses in ability. In brief, intelligence-test results may eliminate or establish deviate abilities as causative factors in many types of behavior problems.

The use of psychological tests when problems of differential diagnosis arise is becoming increasingly fruitful. From diagnosis stem both prediction of the course the individual's behavior will take and information valuable in deciding what measures are appropriate to alleviate or to remove the causes of the condition. Therefore, accu-

racy in diagnosis is important, not merely to give a label but to work intelligently and capably for the sake of the individual. The apparently clear-cut distinctions among various disorders of adjustment made in textbooks are necessary for the sake of clarity in presentation, but the person who comes to the clinician is likely to show little resemblance to classical descriptive models. Often interview and general observation will not give enough information to differentiate clearly between one sort of disorder and another, since some symptoms point one way, others in a different direction. It is here that differential diagnosis on the basis of examination by psychological tests is useful and sometimes crucial.

An illustration of one sort of differential diagnosis will make this more clear. Police authorities requested examination of a man about 35 years of age who had been arrested for armed robbery. They had noticed some things peculiarly stupid in his behavior, including a lack of planning or elementary precaution in regard to the crime for which he was apprehended. A search of community social service records showed both that he had spent some years in a home for the mentally deficient and that the results of intelligence testing gave him an IQ in the neighborhood of 60. Mental deficiency, the previous diagnosis, was, of course, suspected and a routine check made. The Wechsler-Bellevue Intelligence Scale ⁴ widely used for testing adolescents and adults was the means whereby suspicion was first aroused that something was amiss in the previous diagnosis and treatment.

A momentary digression is necessary to explain this device briefly. It permits ready comparison of each of the 11 subtest scores with all the others individually, since in the process of standardization each was equated with the others. Subtests such as those measuring digit-span, arithmetic problem solving, assembling objects, arranging pictures in sequence, and vocabulary knowledge are independent measures, each yielding a score capable of direct comparison with the scores for the other subtests. Each of these subtests, it may be presumed, taps a different mental function or functions. Thus each subtest has a meaning or rationale. Since we know that individuals with different mental disorders show characteristic patterns of

mental functioning, it is not surprising that there are more or less representative patterns in the test scores—that is, high in one test, low in another, almost always failing before reaching a certain level, and so on—because this behavior is characteristic of a certain disorder.

To return to the patient in question, scores on vocabulary knowledge, general information, and arranging blocks in designs were actually above the average of individuals of normal intellectual attainment. In tests which measure ability to concentrate, practical judgment, and certain other functions, he was so very low that his total score when the subtest scores were added placed him numerically as mentally deficient. Nevertheless, his behavior as demonstrated on the tests in which he excelled was of such a quality that a mentally deficient person would be utterly incapable of performing in this fashion. He did certain things a feeble-minded person cannot do and thus threw strong doubt on the diagnosis previously made. Verification on the basis of other findings confirmed the diagnostic inference of schizophrenia, one of the major psychoses. Since his average level of functioning was so low, he had for years been considered mentally defective and had been treated as such, so that instead of receiving appropriate diagnosis and consequent appropriate treatment which might have restored him to normal adjustment, he was mishandled, with the hardly surprising result that he had not recovered; indeed he had probably grown worse.

In addition to the several types of so-called intelligence tests a number of other measuring instruments have been devised. A very important class is achievement tests. These amount to standardized examinations in particular subject matters of the school curriculum. They are available for almost all subjects of the elementary grades, high school, and college. Their value for the psychoclinician lies in the opportunity offered to measure school achievement, uncomplicated by the question of the teacher's bias or local standards.

Aptitude tests, by sampling performance in areas significant to a certain kind of task—for example, mechanical, musical, artistic, or clerical—give some indication of a subject's possible success in those fields. In nature they are similar to both intelligence and achievement

tests and may be used in the clinic to secure information on abilities in specialized fields, especially for the prediction of future performance.

Projective devices form an especially important class of measures of personality characteristics. They differ from the tests previously described in that the subject is allowed practically unlimited scope in his responses. The essential feature of all the varied means of measurement in this field is that the individual child or adult, with little or no instruction in what to do is presented with a stimulus but semi-structured in character and requested to tell what it is or to do something with it. The media whereby this is done include pictures, ink blots, toys, clay, painting materials, words, and incomplete sentences. Ambiguous, with vague or contradictory meanings, as these media are, the subject gives them whatever meaningful connotation his personality permits.

The Rorschach Psychodiagnostic Test⁵ has proved to be an especially valuable device for personality appraisal, especially for the qualitative aspects of intellectual functioning, and the dynamics of the affective or feeling life of the individual. It consists of a standard series of ink blots, some colored, others of shades of gray. The method of construction sometimes is explained to the subject by pointing out that as a child he might have made such blots by pouring ink on a sheet of paper and then folding it, thus making a roughly symmetrical blot. The first card is given to the subject with little more instruction than to tell what it seems to be, what it means for him. He does with it and talks about it as he sees fit. What the situation becomes is dependent on the subject. The blots themselves have no clear-cut structure, and the same one is capable of widely variable interpretation even by the same subject. At one second he may "see" an elephant, at the next second the large colon. The time taken, the method of handling the cards, and the responses given are recorded by the clinician, who later scores according to a variety of categories and ratios of one type of response to another.

It will be remembered that the Rorschach is known as a projective device because whatever meaning is given the blot is projected, that is, placed into it by the subject. For example, an individual may

see "two girls dancing" and go on to describe the grace of movement, the swirling of their costumes, and so on. A moment's reflection will show that there was actually no movement, let alone two girls "in" the ink blot. Something about the blot suggested this to him, while to another person it suggested merely a group of clouds.

Since the individual is not hemmed in with specific instructions, he is more or less free to respond as he pleases. What he pleases to do, however, in the hands of clinically acute individuals is capable of surprisingly detailed interpretation. To those unacquainted with the rationale of the test the amount and apparent depth of interpretation that are given seem to smack of something magical. This lack of objectivity is displeasing to some psychologists since ordinary methods of scientific verification are difficult to apply. The suspicion with which they view projective measures is heightened by the claim of some protagonists of these measures that the customary methods of validity measurement do not apply. There is no doubt, however, that individual clinicians thoroughly acquainted with this approach to personality study find it operationally meaningful and useful. Many of those critical of the approach have had relatively little actual experience with it, and therefore their opinions are somewhat suspect.

Details of formal interpretation and content analyses have no place here, especially since actual use of this instrument requires very intensive training because of its very involved nature. The references given at the end of the chapter, especially those of Klopfer and Beck, read in that order will supply further information to those interested.

The four types of tests mentioned above by no means exhaust the tools of psychometric investigation. Frequently in clinical work instruments are used to measure other aspects of personality and emotional stability, as well as motor coordination, sensory acuity, social maturity, economic status, and so on.

Methods of Treatment.—Although the methods of diagnosis used by the psychoclinician are basically the same in many instances, this is not entirely the case. Some methods of treatment have a spe-

cial diagnostic procedure incorporated directly into their treatment procedures, or indeed hardly have a formal phase deserving the name of diagnosis. In addition, even if such exceptions as those just mentioned are disregarded, it is impossible to speak of a treatment method since, although diagnostic procedure may be similar, methods of treatment vary widely. Therefore, it is not possible to set forth therapeutic plans that can be easily adapted to the requirements of each new case. All methods do have in common the production of a state of affairs in which adjustment to the environment is such that the individual can satisfy his needs. It is possible without doing too much violence to the facts to describe three major types of treatment, although each is apt to be a matter of emphasis of one approach rather than the complete exclusion of the others.

Environmental Manipulation.—From the expulsion of Adam and Eve from the Garden of Eden to the present prescription of a month in Miami, environmental manipulation has been a favorite device aiming at changes of human behavior. Often it did not work because it was given blindly on no more grounds than the pious hope that "the change will do you good." The difficulty was not in the method as such, but in its inexpert application. Increasingly acute professional use has demonstrated its value when changes in environment have been related to individual needs. Inasmuch as a person's behavior is determined in large measure by the environmental factors in which he lives, some attack on these if they be maladjustive is indicated. Sometimes, then, geographical change is necessary; witness foster homes, institutions for the mentally defective and delinquent, prisons, and mental hospitals. Although other methods dealing directly with the patient may be applied at these institutions, some of the treatment value consists of removal from an environment which was conducive to behavior difficulties.

Environmental manipulation is by no means limited to geographical manipulation; often it is more dependent on changes of attitude of those in the orbit of the individual. Particularly successful with children are attempts to change parental attitudes and methods of dealing with the child.

A mother of a ten-year-old girl complained first of the child's enuresis and then of her disobedience and forwardness. Investigation of the problem revealed that a five-year-old brother received most of the attention from both parents. Without paying specific attention to either the enuresis or the disobedience, the parents were advised to plan the children's bedtime so that the girl would have a half hour alone with the parents. In two weeks the father voluntarily reported that the girl's whole attitude had changed and that there were definite signs of improvement as regarded the enuresis. In this case nothing was done about the problems as such, but an effort was made to relieve the tension surrounding the girl's feeling of neglect. With correction of the cause the symptoms disappeared.

In such instances it is the parent who must carry out the details of the corrective program. The parents must assume some responsibilities in many cases in which the school or persons outside the school are primary factors. If the parents cannot or will not cooperate, or if one or both are dead, the problem may involve finding a suitable foster home. In such cases the cooperation of social workers or child-placing agencies must be secured. When the behavior problem or an academic adjustment problem is associated with the school, the corrective program must be in that direction. It may mean reassignment to grade or classroom, irregularity in curriculum, change of school, and so on. Here the teachers and school administration must assume responsibility for carrying out the program under supervision of the psychoclinician.

Re-education.—The remaining two kinds of corrective procedures are directed at the client himself. The first of these is re-education or tutoring in a narrow sense. In cases of speech difficulty, poor motor skills, special-subject disabilities, and the like, the treatment is primarily a special teaching program. Children of very low ability and sensitive children of especially high ability may need an individual program of teaching. This is sometimes carried on by the psychologist himself and sometimes by a specially trained teacher. The theory underlying treatment of this sort is that defects in certain special types of behavior may be overcome by specific training. It

is not merely in the sphere of the disability alone that improvement is expected. Removal of a disability often carries away in its wake a host of attendant difficulties. The child who turns to truancy because of the frustrating experience of the classroom and is then given successful re-education is likely to find school work more enjoyable and truancy less tempting if he holds his own with his classmates.

Psychotherapy.—Psychotherapeutic procedures may be said to fall into two general types, supportive therapy and insight (uncovering) therapy.⁶ The first is concerned with giving the individual enough help to stand life's vicissitudes without, however, effecting permanent personality changes. An individual who has a problem, who has an emotional upset due to some environmental disturbance, is helped along by suggestion, persuasion, information, orders on what to do, and so on. Once over the difficulty, the individual is essentially the same person as before.

Symptomatic treatment, that is, removal of symptoms without getting at the underlying causes, belongs in this category. For example, hysterical blindness may be removed by hypnotic suggestions to the effect that the individual is no longer blind, but the psychodynamic constellation which created the symptom in the first place is still present and the blindness may appear again or the unchanged personality pattern may result in the appearance of other symptoms, such as a loss of feeling in an arm. The person is not changed, the symptom is removed, and what made it appear in the first place may make it come back or appear in different guise.

Much of what is called guidance or counseling is supportive in nature. The person who is in doubt about his vocation, after the diagnostic procedure previously described, may merely need reassurance that his plans are appropriate or he may need information about certain vocations in order to reach a decision. In many instances no more is needed; the individual's personality is strong enough, a temporary treatment need is met, and the individual goes on without further assistance. Judgment, however, as to whether or not something more is necessary is by no means easy. The cause of his appear-

ance in the clinic—inability to decide on a vocation—may or may not reflect adequately the true picture. He may, for example, have an insatiable longing for dependence upon someone, disguised even from himself, which, in turn, may be symptomatic of a deeper and more severe personality conflict. Although the vocational indecision may be cleared up, it will be replaced by other problems. This, however, should not be taken as a general criticism of the value of guidance. In most instances where it is applied, it is useful and appropriate.

Classical psychoanalytical technique, the theoretical basis of which is examined briefly in Chapter XXI, is considered to be primarily an insight therapy. The individual in the course of his analytic sessions is led to understand himself by learning to handle more healthfully the same emotional constellations against which he developed defenses of a maladjustive character prior to his analysis. In the permissive, protective atmosphere of the analytic hour he tries out his emotional patterns on the analyst to whom he has formed an attachment (transference). Gradually he is encouraged to use these same ways of dealing with his emotions in actual life situations. Understanding why he did or thought or felt certain things, because the reasons have been uncovered, he can give them up and adopt the more adjustive, more healthful, more self-understanding ways of dealing with the problems of everyday living. This insight is by no means merely intellectual; it includes a large emotional component, since the individual must feel all the manifold implications of his thought, feelings, and actions, and accept them, not merely understand them rationally.

Another insight therapy, the nondirective or client-centered approach, vigorously fostered by Rogers, a psychologist,⁷ has gained considerable vogue among psychologists as a means of treatment. The client, himself, is responsible for the direction the sessions may take—hence, the rather misleading term “nondirective,” for what is, more strictly speaking, apparently “nontherapist-directed.” “Client-centered,” a term in recent use, expresses the idea more positively, placing the emphasis on the client’s understanding of himself. Both by a permissive attitude and verbal expression, the clinician says, “This is your hour: do with it as you will; talk about what you

want." Free expression of feeling is encouraged. The clinician responds primarily to what he judges to be the feeling of the client, being careful not to persuade or advise, and thus he assumes what superficially, at least, appears to be a passive role. Since self-insight is stressed, the clinician doesn't have to know too much about what is going on; to reflect, to verbalize, feelings as they appear is enough. The individual patient, considered to have a tremendous capacity for self-growth, is supposed to achieve self-understanding and independence, and, at some point along the way, to realize he no longer needs the sessions and then more or less spontaneously to close the meetings. Little or no attention is paid to diagnostic procedures as we have described them since they are considered unnecessary. For example, in effect, tests are used only if the client reaches a point where he requests them.⁸

Although some clinicians have used this technique with apparent success, it is still relatively new. Criticism by other psychologists and by psychiatrists has been quite strong, centering in many instances on what they consider to be a superficial approach by inadequately trained personnel to a very complicated problem. They point out that mere acceptance of feeling is not enough, that there is really active direction even if the counselor doesn't realize it, and that active direction must be consciously in the hands of the therapist, not left to the self-insight of the client alone, especially since the cases thus treated may well include some for which a little self-knowledge is a dangerous thing.

Lest the conclusion be drawn that supportive and insight therapy are sharply and distinctly different, certain factors common to all forms of psychotherapy should be mentioned. The patient's faith in the therapist is necessary for changes to take place. If he doesn't believe in the ability of the clinician, the desired effects are hardly likely to come about. Faith in the therapist is a reaction to certain limited aspects of a larger, more important factor common to all psychotherapy, the personality of the therapist. Although not all that goes into the making of the personality of a successful practitioner is known, there would be little quarrel with the statement that some of his traits would be self-confidence, permissiveness, calmness, friendliness, ability to handle problems nonjudgmentally, alertness to

the feelings of the person, and the like. Since no school of psychotherapy can lay claim to the adherence of all good therapists, this is a factor implicit in diverse systems of treatment.

Another common element in psychotherapy is the opportunity for catharsis, roughly equivalent to the common experience of "getting something off one's chest" whether by words or actions. The outpouring of emotionally toned material in itself is beneficial. A form of therapy which stresses this feature of release of emotional tension is play therapy. This is a method of helping children work out their problems through play, which is their natural means of expressing themselves. The child is encouraged to use toys, paint, clay and water in any way that he sees fit, not rigidly regulated as in so much "nice" play. Often the child acts the way adults do when they take it out on the woodpile. A child may throw the clay on the floor and step on it; he may cut, hit and throw toys, spill water on the floor, and dismember dolls, so constructed as to be readily disjointed, thus obtaining pleasure and relief. For example, a child referred to a psychiatrist because of temper tantrums, periods of not speaking, and lack of responsiveness to affection, was found after 19 such play sessions to show a definite increase in affectionate responses and a more outgoing outlook along with a marked increase in speech. No interpretation was offered the child, the release engendered seeming to be enough to produce these changes.⁹

It might be thought that since no greater self-understanding was brought about, this could properly be classed as a supportive therapy. However, it is one of the virtues of the play approach that it can be used both as supportive and as insight therapy, with most cases involving emphasis on one or the other rather than a total exclusion.

An instance of insightful play therapy is the interpretation for the child of his play with dolls that he has identified as mother, father, brother and sister, with particular emphasis on the feeling he exhibits toward them. If a six-year-old boy in playing with the boy and girl dolls says that "the boy" is angry at his sister doll, the therapist will not rush interpretation but will agree by reflecting back in so many words the same statement. Only when the boy says, "I am angry at my sister too," is the therapist in a position to interpret the hostility the child feels toward his sister, which he

has been in the process of playing out. Thus we see that both release and interpretation take place in the same process; the child obtains relief, builds up trust in the therapist and in the situation, until he can face the fact that he has these feelings toward his sister.

Many other variations of therapy exist. The volume by Alexander and French given as a reference at the end of the chapter, although somewhat difficult to read, is well worth careful study. The topic of therapy, if adequately treated, does not lend itself to easy reading, a hardly surprising fact, considering the complex and yet delicate matter that it is. Years of academic training and clinical practice in those temperamentally suited for the task are necessary if one is to be a well-grounded practitioner.

TYPES OF PROBLEMS

Clinical psychology is practiced in all spheres of human behavior in which problems of human adjustment arise. The previous discussions of abnormal psychology in Chapters IX through XI and the later discussions of vocational and professional psychology in Chapters XVI through XVIII illustrate problems with which the clinical psychologist is concerned. However, here attention will be directed to issues in which the clinical psychologist made his earliest and most distinctive contributions, the problems arising from mental deficiency, from the school, and from the behavior problems of children.

Mental Deficiency.—In Chapter XII, in connection with differential psychology, the distribution of ability levels is discussed. Those persons whose behavior places them at the lowest end of this distribution are commonly spoken of as feeble-minded or mentally deficient. Because of their limitations academically, occupationally, and socially, the feeble-minded are all psychological problems. It is with this group that clinical psychology has made some of its most useful contributions.

Mental-Test Criterion of Deficiency.—Although feeble-mindedness has been defined in terms of test performance—for example,

Terman says that a Stanford-Binet IQ less than 70 designates feeble-mindedness—it is dangerous to depend upon this criterion alone. It is well known that performance on the Binet or other tests may be affected by purely temporary factors and that the scores are seldom exactly the same from test to test. Therefore, if a child gets an IQ of 72 on one examination, he is not feeble-minded according to Terman's criterion. A year later, however, when his Binet performance results in a perfectly reasonable drop of five or more points he would suddenly be regarded as feeble-minded. Also scores even on tests similar to the Binet, in that they require language ability, may be quite different. Subjects who are very poor in language may be average or better on nonlanguage tests. Therefore, the psychometrician's criterion of feeble-mindedness on the basis of test performance alone is definitely misleading.

Social Criteria of Deficiency.—If we attempt to delimit feeble-mindedness by actual observation of defective people, we find that a social criterion is the most useful one. The British Mental Deficiency Committee defines feeble-mindedness as “a condition of incomplete development of mind of such a degree or kind as to render the individual incapable of adjusting himself to his social environment in a reasonably efficient and harmonious manner and to necessitate external care, supervision, or control.” This definition is the prototype of all those based on a social criterion which is now recognized as the best by clinical psychologists.

Low-Grade Defectives.—Inasmuch as feeble-mindedness is not defined in terms of so-called intelligence alone, the psychologist has a very definite diagnostic task. The diagnostic problem of the two lowest grades of feeble-mindedness, that is, idiocy and imbecility, is not usually difficult, and an adequate conclusion can be drawn on the basis of test performance where the IQ is consistently below 20 for the lower category and below 40 for the higher. Comparison of nonstandardized behavior, such as play with children of younger ages, may indicate the behavior level of the subject. In short, the lowest levels of feeble-mindedness are not difficult to recognize. It is also important to note that the lowest levels do not constitute very

serious social problems because of their small number and entirely inadequate capabilities; at most they require custodial care throughout their lives, thus being a social burden rather than a social menace.

High-Grade Defectives.—The highest grades of feeble-mindedness—that is, the moron and the borderline—constitute the majority of all the mentally deficient, and sometimes they are of high enough ability to be able to remain at large in the community. It is these highest groups which present the most serious social problems since they frequently engage in antisocial behavior. They are also the more difficult diagnostic problems. As the most serviceable distinction between the feeble-minded and the not-feeble-minded must be based upon social adaptability, diagnosis must establish the probability of the subject's making a social adjustment, albeit at a low level. While performance on a variety of tests and at different times is a good starting point, a final conclusion can be drawn only through a knowledge of other facts: Has the subject's behavioral development shown retardation? How well has he adapted previously to social requirements? Has he exhibited delinquent or impulsive behavior? What are the details concerning his school achievement? These are examples of questions which should be answered.

Two cases will make clear the contrast between the feeble-minded and the not-feeble-minded when both have shown similar test performances. One man of 25 has a mental age of 8.5 years (IQ about 60) on the Binet; he left school at 16, having reached only the fourth grade, but it is reported that he always seemed eager to learn and worked hard; after leaving school he obtained a job in a garage as a chore boy and in a few years he learned something about auto mechanics; he is now working steadily and is considered a good workman, although a little slow. The second case is that of a girl of 18 with a mental age of 10.5 years (IQ about 75); she left school at the age of 16 when in the sixth grade; her teacher reports that she was promoted because of her size rather than her work; she was always a trouble-maker and in conflict with both teacher and parents; at the time she was seen she had been arrested for solicitation; she did not mind going to a penal institution and, yet, stated

she intended to "go back on the streets" when released. Brief though these cases are, they do indicate the dangers of accepting test results at face value. The man apparently has a higher ability in manual skill which he is able to use in making a vocational adjustment at a relatively high level. In spite of his low test score he can hardly be called feeble-minded. On the other hand, the girl does not use her ability to its best advantage and seems unable to make an adequate social adjustment. To call her feeble-minded does no violence to the facts.

School Problems.—As the clientele of many psychological clinics consists predominantly of school-age children, it is evident that school problems would be very frequent. Children are referred to clinics because of generally poor school work and retardation, because of disabilities in specific subjects, and because of social and personal adjustment difficulties. The last of these we shall consider later.

Low-Grade Level of Ability.—There is no doubt that most children who are retarded in their grade placement are below average in ability as measured by tests. In the smaller proportion of cases their ability may be low enough to be considered feeble-minded. In a much larger proportion of cases, perhaps 15 per cent of all school children, the mental level is higher than feeble-minded but lower than average. The task of the psychologist in these cases is to evaluate the evidences of mental level and advise the teachers what they may expect from such children.

Nonintellectual Factors.—While low ability is certainly a reason for retardation and poor school work, it is not the only reason. The classroom teacher is perhaps a little too inclined to decide that a child is stupid because he is retarded or because his work is poor. It is a task of the school psychologist to determine the real reasons for the child's poor work. Apart from low ability, we find that children may be retarded because of poor physical condition, inadequate visual or auditory acuity, emotional and personality disturbances, poor work habits, irregular school attendance including ab-

sences and changing schools, personal attitudes of discouragement and inadequacy, parental attitudes stimulating the child against school, special difficulties in one subject, and many other less common reasons. Evidently the discovery of reasons for poor work will require careful clinical study of the child and his history—it is very definitely a purely psychoclinical problem.

Special Deficiencies.—Special disabilities in school subjects, mentioned above as a reason for retardation, are rather frequent academic problems. A child may be doing well in all of his work except one subject, such as reading, history, algebra, or language. Quite evidently such a special deficiency will reduce the general average of his work and in certain cases will be a reason for poor achievement in much of his subsequent study. In the primary grades attention is devoted chiefly to those subjects—reading, writing, spelling, arithmetic, language—which are the necessary tools for all academic work. The work of higher grade levels includes subjects such as history, geography, and science, the content of which is most important. All of these obviously require skills in the tool subjects, and inadequacies in the content subjects are usually based on lack of the tool skills, unsatisfactory preparation, lack of motivation, or social or personality difficulties which interfere with many adjustments.

Behavior Problems.—Probably the difficulties most frequent in general child-guidance clinics are those commonly called primary behavior problems. These include habitual patterns of behavior, not due directly to physical or mental disabilities, which either are socially disturbing or interfere with the individual's own personal adjustment. The former types are usually called conduct problems, the latter personality problems. This simple dichotomy has its uses, but extensive clinical experience shows its weakness. As we cannot attempt here to show its inadequacy, we shall use it as a convenient way of dividing the problems into groups for discussion.

What Is a Behavior Problem?—Although we speak of problem behavior, we must realize in the very beginning that there can be no precise designation of what kind of behavior is a problem. We

know by observing a person how he behaves, and we can know his thoughts, beliefs, ideals, attitudes, and other such implicit behavior only by observing what he overtly does in various situations or by observing what he says. This is true of any sort of behavior. If what he does or says violates standards, ideals, or rules of the social group, we immediately consider it problem behavior. Thus the child who swears is frowned upon; the thief is socially condemned; the child who refuses to eat worries his mother; the temper tantrum disrupts the household. All these types of behavior and many more are considered problems because they are socially disturbing. This much is clear.

If we look a bit further, however, we find that the swearing child's parents do not object; the policeman is not concerned about temper tantrums on his beat; and the underworld praises the thief. Thus the same behavior pattern is a problem to one social group but not to another. The conclusion must be that problem behavior can be so judged only in the light of social norms. Exactly the same things are true concerning that behavior which is not socially disturbing, for example, withdrawing, fear, or jealousy. The shy, timid, quiet child is welcomed by some teachers because he causes no trouble, and there are parents who actively foster such behavior in their children. Here the norms which are violated are mental-hygiene ideals which, unfortunately, are not widely known except by persons professionally interested and trained. Such persons recognize this behavior at least as serious as the actively disturbing behavior.

Behavior that Violates Social Ideals.—There is much evidence that social or personal ideals govern the designation of what behavior will be considered a problem. Wickman's well-known study¹⁰ indicated that teachers considered that behavior which was most contrary to personal ideals or school regulations as more serious. On the other hand, professional mental-hygiene workers rated the non-disturbing, withdrawing behavior as more serious.

It is true, of course, that some behavior, such as stealing, violates social norms, and although the family group or the immediate neighborhood may not object, society as a whole does. Therefore,

there are certain kinds of behavior which are generally regarded as undesirable. On the other hand, a mother or teacher may object to behavior which is a problem to her alone. Thus one teacher in Wickman's study held gum-chewing and failure to stand when speaking in the classroom as almost heinous reactions, and many mothers are greatly worried by the terrible behavior of their ten-year-old boys when they fail to wash cleanly behind their ears. Keeping clearly in mind the tenuous nature of the definition of primary behavior problems, we may now turn to a brief discussion of their nature with heavy reliance upon the views of C. M. Louttit, an authority on children's behavior problems.¹¹

A Classification of Problems.—From the foregoing it is evident that behavior which is socially disturbing—the so-called conduct problems—would be more frequently the basis for referral to a behavior clinic. Considering the complaints alone, we find a wide variety of problems; in fact, each case is almost unique. However, it is possible roughly to group the problems into classes and to arrange these in order of increasing social seriousness. As it will be impossible to discuss each specific problem in detail, a brief catalogue will give the reader an idea of the nature of the problems with which the clinic must deal. Among the behavior difficulties causing concern in the home the following are most frequent:

Feeding difficulties: poor appetite, food fads, excessive appetite.

Elimination problems: enuresis, soiling, constipation.

Sleep disturbances: wakefulness, nightmares and night terrors, drowsiness.

Sex problems: masturbation, excessive modesty, sex curiosity, sex acts.

Emotional problems: temper, excitability, over-activity.

Temperamental problems: disobedience, carelessness, untidiness.

Another group of problems are of consequence in the home, and also to people outside of the home, in the school and community. These include lying, swearing, vulgar and obscene language, fighting, destructiveness, incorrigibility, teasing, cruelty, etc. The problems of wider social significance are, of course, those which are considered

legally as delinquencies. While these have significance in the smaller social groups already mentioned, they are perhaps of greater importance to the whole of society. Delinquencies include stealing, truancy, begging and vagrancy, injury to persons, murder, arson, injury to property, etc.

Personality Problems.—The problems which are not socially disturbing—the so-called personality problems—also show a sequence from the relatively mild to the very severe. In general, the less obvious personality problems are characterized by submissive, withdrawing behavior; more specifically we can list inferiority feelings, seclusiveness, bashfulness, dependency, self-accusation, etc. Among other types of problems of this class that are somewhat more evident to observation are:

Self-centeredness, including boasting, egotism, showing-off.

Jealousy.

Fear: cowardice, anxiety, worry.

Daydreaming and absent-mindedness.

Negativism: rejection of affection, shirking.

Suspiciousness and feeling slighted.

Listlessness, laziness, lack of ambition.

Essentially similar in general nature to these milder personality disorders, but more severe in degree, are the conventionally accepted mental disorders, that is, the psychoneuroses and psychoses.

The enumeration given in the last few paragraphs indicates the nature of problems which are dealt with in the behavior clinic. It must be kept very clearly in mind, however, that the clinic deals not with a problem, but with a child or adult who exhibits a problem or a whole constellation of problems. We are frequently asked, "What can I do with my ten-year-old son who has no ambition and is lazy?" That question cannot be answered until we have some knowledge of probable reasons why the child is lazy and lacks ambition. It is in the effort of trying to understand a particular child and his problem behavior that we need the information discussed in the beginning of this chapter.

A Study of Causes Is Imperative.—The need of knowing the causes of a particular problem in a particular child may best be shown by two cases in which the complained-of behavior is similar, but which from the point of view of etiology are quite different. In both of these cases the referent was disturbed because the children lacked confidence, withdrew from usual contact with other children, and exhibited fear. In both cases the problem was evident in school adjustments. On the basis of the behavior alone both would have to be classed in the submissive, withdrawing group. Information concerning the history of the two children, however, clearly shows the difference between them. One case, a nine-year-old boy, came from an economically and socially superior home. The father, however, was extremely timid, both in his own behavior and in his expression of concern over his son. The boy was always being supervised by the mother or father. No rough play was permitted. Both parents constantly cautioned the boy against getting hurt, and they encouraged him in his overcautious attitudes. With this sort of environmental influence it is little wonder that the boy lacked confidence and avoided close contact with his classmates.

The contrasting case was a high-school girl who came from an immigrant home of low economic and social level. The parents spoke only the foreign tongue of their home land. The girl spoke the foreign language also, but earlier in her life she had learned English as spoken in her own foreign community and with a very pronounced accent. About the time she was to start high school the family moved from the foreign neighborhood so that the girl had to attend high school with children who did not speak her sort of foreign-accent English. The other school children teased her and did not accept her. Her reaction to this environmental influence was to avoid the other children. She withdrew from contacts, lost confidence in herself, became fearful of association with the other children.

In these two cases the net result in observable behavior was essentially similar. However, it is quite evident that they are entirely different problems. Without a very careful investigation of the children's histories, only the most significant points of which

are briefly related here, it would have been impossible even to begin planning a method of helping them.

PSYCHOLOGICAL SERVICE IN CLINICS AND INSTITUTIONS

The origin of the type of work that has been described and the term "clinical psychology" are the contributions of Lightner Witmer, who first proposed the possibilities of this sort of psychological application at the University of Pennsylvania in 1896. Further impetus was given through the somewhat later appearance of psychiatric interest in the problems of childhood. These two approaches, the university centered psychology and the medically oriented psychiatry, traveled their own paths for some time, and even now some points of emphasis and some differences in orientation exist. The psychological contribution in the development of tests, especially the Stanford Revision of the Binet Test which appeared in 1916, led to an acceleration of the psychological study of individual children. The appearance of the group test, roughly coincident with and given great impetus by World War I, resulted in considerable advances in applied psychology. Unfortunately, however, the group test's ease of application and relatively large returns of information per unit of time caused a temporary relative abatement of interest in the more cumbersome and more difficult-to-apply individual test. With the realization that the group test was not a substitute for the individual test and that the latter supplied much information that a group test could not give, interest in the individual test—never, of course, entirely dormant—was revived. Then, too, emphasis on the case study as a whole, not merely psychometric findings, resulted in the restoration of the original clinical methodology described in the previous sections of this chapter. World War II and its aftermath served to accelerate these trends already in operation. Today there are about 3,000 psychologists engaged in application of the clinical method.

A question frequently asked by students is "Where does the psychologist do the sort of work you have described?" A plausible approach in answering this question is to consider briefly the kinds of clinics and institutions where the mentally deficient child, the

adult psychotic, the vocationally undecided adolescent, the delinquent boy, the neurotic veteran, the nonreading boy, and the college student with feelings of inferiority may be seen professionally by the psychologist. The inference should not be drawn, of course, that professional help in regard to each of these problems is received only at the agency described. Many of the organizations are concerned with persons showing all, or almost all, of these problems of adjustment. But the individual agencies tend to find more of their cases drawn from those who exhibit one sort of failure of adjustment rather than another.

The feeble-minded child is often brought to the attention of a psychological clinic attached to a college or university. Once the case has been referred to the clinic by parent, physician, social agency, or school system, it is the function of the staff to diagnose the problem and to make suitable recommendation for disposition and treatment. Placement in an ungraded class where training suitable to the child's ability will be given while he still lives at home or placement in an institution for the mentally deficient are two of the many treatment procedures followed. Psychologists are also attached to the staff of the training school for the mentally deficient where they verify the appropriateness of the decision which brought the child to the institution, help to plan his training, and check his progress with appropriate psychometric measures.

In the mental hospital the psychologist functions as a specialist under medical supervision and as a member of a clinical team. In such a hospital the majority of patients are suffering from one or another of the so-called psychoses described in Chapter XI. Some hospitals have all newly admitted patients examined by psychologists; others use the staff of the psychology section on the basis of referral of the patient for some special purpose. Whatever the organization, the purposes of psychological examination are substantially the same. Differential diagnosis, as in the illustration of the psychotic who had been previously judged mentally deficient until his test pattern revealed discrepancies of which a feeble-minded individual would be incapable, is an increasingly important function of mental hospital clinical psychology. Establishment by the Rorschach Test of clinical signs that differentiate patients showing organic changes in the

nervous system from those showing substantially the same behavior in functional disorders in which there is no observable structural change is another illustration of differential diagnosis by use of psychological tests. A closely related problem is the examination of the patient for the purpose of deciding what form of treatment is apt to be most effective. For example, intelligence at least at the dull normal level is necessary if insight therapy of a thoroughgoing sort is to be applied. The severity of the disorder from which the patient is suffering may be in part judged by the severity of the "signs" revealed in testing. Lest, however, the conclusion be drawn that these piecemeal approaches represent the most important contributions of the psychologist, it must be emphasized that his major professional contribution is the personality analysis in which the focus of the examination is upon using psychological resources for the development of professional insight into all the forces which make the patient the unique individual that he is, that is, the case study in its fullest sense.

Problems of vocational, educational, and personal nature come to the attention of workers in guidance and student personnel, either in secondary and collegiate educational institutions or in private counseling agencies. Group tests are used more often than individual tests, especially those measuring interest, intelligence, aptitude, and achievement, and the emphasis is likely to be on the solution of some specific problem, such as vocational choice, rather than upon a complete personality study, although this occasionally is carried out. Indecision in regard to vocational plans is a typical problem. The focus on the individual characterizes the clinical as opposed to the group approach in guidance programs.

The delinquent boy often comes to the attention of the juvenile court or child guidance clinic where the psychologist functions to help find the causes of his behavior that brought him into the difficulty. Environmental manipulation, work to change the attitude of parents, and various more direct means of treatment are used. On occasion, a juvenile-delinquent training school is considered the most suitable environment for treatment. Here the psychologist functions to help plan training, engages in this program as an educational spe-

cialist, and helps to decide by means of further interviews and tests when the boy is ready to leave the institution.

As a part of the enormously increased Veterans Administration Program, mental hygiene clinics have been established in many of the cities throughout the country. The veteran showing emotional difficulties who can be treated in the clinic while still maintaining his position in the community is the typical patient. Both diagnosis and treatment are conducted by the staff which includes psychiatrists, psychologists, and social workers. The psychologist performs diagnostic tasks, using tests, interviews, and other techniques, and, under direction of the psychiatrist, conducts psychotherapy if his previous training and experience make this desirable.

Psychologists attached to school systems often encounter the student who has specific subject disabilities, such as reading disability. Along with the usual psychometric instruments, the school psychologist applies reading diagnostic tests and, on finding the apparent causes of the difficulty, plans a remedial program. This often takes the form of special tutoring, generally conducted by special or regular classroom teachers. The psychologist serves most often in a consultant capacity, checking on progress from time to time. Other major problems that concern the school psychologist are the degree of educability of the retarded child, behavior and habit adjustments, and vocational guidance.

Various colleges maintain mental-hygiene clinics directed either by psychiatrists or by psychologists concerned with those minor deviations from the normal present in many otherwise normal individuals. The student with feelings of inferiority is illustrative of one type of problem. Explanation, persuasion, and reassurance of a supportive character are often used therapeutically, although some clinicians try a more nondirective approach. Often there is less emphasis on psychometric testing than is the case in other agencies. The emphasis here, as implied by the very title, is on the prevention of more serious abnormalities by early treatment.

This necessarily brief enumeration is by no means complete. Psychologists are found in general, neurological, and tubercular hospitals, agencies for the rehabilitation of the physically handicapped, nursery schools, family and marriage counseling centers,

industrial concerns, schools for the deaf and the blind, VA and USES guidance centers, prisons; and old-age counseling centers, as well as in private practice either as general practitioners or as specialists in one of these functions. The common thread unifying the endeavors of all clinical psychologists is their application of the clinical method of diagnosis and treatment for the purpose of solving or alleviating problems of human adjustment.

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CHAPTER XV

INDIVIDUAL MENTAL EFFICIENCY

By DOUGLAS H. FRYER

New York University and Richardson, Bellows, Henry and Co., Inc.

Developing and maintaining mental efficiency is a problem of everyone, and particularly of youth, in a society where better living is both an individual and social goal. Education has this as its purpose. Through general education, habits unfold in the use of mental tools and in the application of mathematical, scientific, and philosophical concepts. In specialized education, skillful patterns of performance and logical ways of thinking are formed as they are to be used in the work of the occupations. Each science has its technical language; each profession and each business has its field of knowledge; all work has its specialized habits. Whether general or special, education should develop and maintain efficiency in the individual.

True education is what the individual seeks for himself. It cannot be forced upon him, but he can be guided, if he will, by information about methods for the development of personal efficiency, and by information concerning channels of advancement and progress in attaining knowledge and skills. To give this information is the purpose of vocational and educational guidance as it is furnished by counselors and teachers in school systems and social agencies. Its use is left to the individual, and the value of the guidance is determined by the direction he takes in his development.

Educators believe that maximum efficiency brings the greatest satisfaction for the individual, that all should strive for this goal with the best direction available, that personal adjustment in life comes from attaining the greatest individual efficiency possible in mental and physical work. Whether it is true that greatest happiness is determined by maximum individual efficiency has yet to be proved

and there are, to the contrary, many anecdotes of the satisfied Robinson Crusoe and the happy moron. But this is, in any case, the philosophy of many civilized peoples.

Developing and maintaining mental efficiency is concerned with such matters as the best methods of learning and of work, how to interpret the signs of fatigue, what rest accomplishes and when and how it should be taken to best advantage, what motivates people and how their energy can be directed toward profitable goals, how outside influences affect work, what effect distractors and rhythms have upon people, what are incentives to accomplishment and how they can help in gaining greater efficiency, the effect of various working conditions, what effect drugs and smoking have, and how morale can be maintained in a working environment.

The scientific facts bearing on mental efficiency come from many areas of research in physiology, psychology and social science. Many of them are referred to elsewhere in this book. This chapter assembles the information on the growth of mental efficiency, and on the influences affecting it, from the point of view of use by the individual in his development with the goal of increasing his productivity and adjustment.

LEARNING AND WORK

The acquisition of knowledge and skill is what we mean by learning. It is the formation of work habits. But learning may continue in any task long after acceptance of the individual as an artisan. Work is the exercise of mental and motor habits of varying degrees of efficiency. Accordingly, learning, from its initial acquisition, is work. But by definition learning is the development of habits to an accepted criterion of work.

Theoretical curves for learning and forgetting, and for work and recovery from fatigue, are shown in Fig. 21. These curves are interpreted from various measures of performance. Number of successive tests of performance—representing time—is indicated on the abscissa. Score in the tests—representing amount of performance—is indicated on the ordinate. Many influences bearing upon learning, forgetting, work, and recovery from fatigue would change these curves

from their theoretical form and one would never expect a curve for an individual, or a curve plotted from the averages for a group, to be exactly like these curves.

Learning.—All learning progresses in a characteristic manner whether it be the learning of languages, occupational skills, or pro-

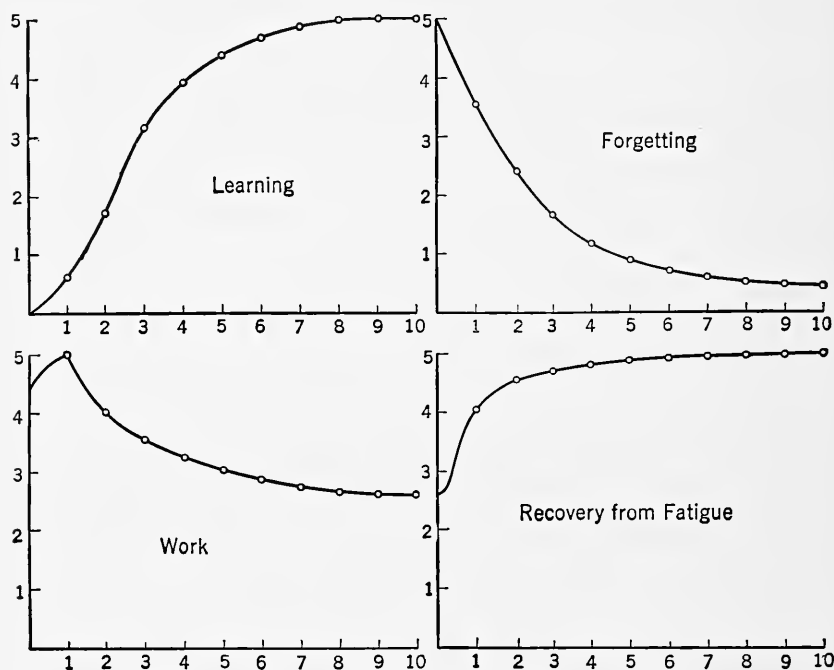


FIG. 21.—THEORETICAL CURVES OF PERFORMANCE ILLUSTRATING LEARNING, FORGETTING, WORK, AND RECOVERY FROM FATIGUE
(Tests of Performance on Abscissa; Amount of Performance on Ordinate)

fessional knowledge. Progress is similar for various tasks, but the number of learning periods necessary to achieve an acceptable level of accomplishment will vary, of course, according to the difficulty of the task. Generally, acquisition is greater during the early stages of the learning; it becomes less and less as the learning progresses toward perfection. But if the material to be learned is essentially new, acquisition may be increasingly greater during the very early

stages of the learning. This is due to the initial difficulty of any new tasks. A fuller description of learning will be found in Chapter V of this volume.

Learning Curves.—Progress in learning can be plotted as a curve on cross-section paper with the number of trials on the abscissa, or X-axis, and the amount of acquisition on the ordinate, or Y-axis. The general form of the learning curve will be noted in Fig. 21. Various features of learning curves have been described as initial spurt, end-spurt, plateau, insight, positive and negative acceleration. The initial spurt represents transfer from previous learning. An end-spurt represents final motivation to achieve the goal. If an end-spurt appears in a learning curve it is followed by the usual end-plateau, which is said to represent the “physiological limit” of learning. The plateau, which is a flat place appearing at various parts of the curve, may represent a constant obstacle in acquisition which must be overcome before progress can continue. Insight is defined, often, as a rapid rise in the learning curve. It appears frequently in curves of learning of complex materials and is essentially an instantaneous solution of a necessary part of the task. By definition, the end-plateau in the learning curve is the beginning of the work curve.

Positive acceleration in learning curves indicates learning of increasingly greater and greater amount, and it is found only in curves derived with essentially new material and then in their early stages. Most curves are negatively accelerated throughout, thus representing ever-decreasing acquisition. Learning is usually influenced by previous learning. However, the curve adopted to represent all learning from its beginnings is positively accelerated in its early stages and negatively accelerated in its later stages. It is S-shaped, as illustrated in Fig. 21.

Individual Differences.—Individual learners vary considerably from the average of learners in a task. Progress all along the way from the initial trial to the end-plateau is different for most individuals. There are “poor” and “good” learners for any task in education or industry.

These differences are often due to previous training in tasks which are prerequisites of the learning. "Background," as it is called, determines the goodness or poorness of the individual's efficiency in specific learning situations. Learning efficiency in any task, whether it be Latin in college or machine operation in the vestibule school, is based on prerequisite training. But most obvious differences in learning are evident when intellectual capacity varies widely between individuals, such as might exist if the average marine engineman and the average tool-and-die maker were set the task of learning certain processes of mechanical engineering. Such individuals usually differ in inherent capacity to learn in many specialized tasks.

Forgetting.—Forgetting is the converse of learning. It is at least in part a process of inhibition of formerly learned habits by new learning. The theoretical curve of forgetting falls rapidly at first and its slope becomes more and more gradual with time. It is negatively accelerated, as in Fig. 21. The steepness of the slope is in inverse proportion to the amount of overlearning. Forgetting of language and of motor learning follows exactly the same course, and duplicate curves result if the criteria of the learning are equivalent.

Training.—Training in any skill frequently starts at a level far above the beginnings of learning that skill. Many elements in the skill have been learned long before the training. This is true of both verbal and motor skills. Thus the curves for the acquisition of occupational skills are often much flatter than is shown in the theoretical learning curve (Fig. 21) and represent the top of that curve. Forgetting curves of occupational skills, also, are much flatter, because of overlearning through work at the skill.

Work.—Mental and physical activities often are distinguished as two kinds of work. This is an arbitrary distinction, for both mental and physical work involve neuromuscular units. The only valid physiological distinction between physical and mental work is in the number and size of the effectors or muscle groups that are active in the work.

If learning were the only influence upon work and the physiological limit of the learning had been reached, efficiency in work should continue uniformly, without variation, and the curve of work would be a straight line, running parallel to the abscissa at the height of the end-plateau of the learning curve. That this is not the case is evident to all. Working efficiency depends upon many influences other than the degree of learning.

Work Curves.—Measures of work are plotted in a manner similar to those of learning, with the periods of work on the abscissa and the amount of work on the ordinate. Curves may be prepared to indicate efficiency over periods of years as well as a few hours or minutes. Work curves in industry show daily, weekly, and seasonal fluctuations. Individual curves for experimental periods of work may show initial spurt, end-spurts, learning, rhythmical or “chance” variations during the work period, and the performance decrement of fatigue. The general form of the work curve is illustrated in Fig. 21.

The curve of work was first established in 1889 for a work period of one hour by Axel Oehrns,¹ a pupil of Kraepelin, upon 10 professors and graduate students, with various kinds of materials. While rising at the very first, due to learning, the curve of work falls gradually, due to fatigue, almost from the beginning to the end of the work period. The length and height of the initial rise varies with the kind of task and with the individual subjects. Oehrns established the point of maximum efficiency, which is the point where fatigue begins to overbalance learning, as 24 minutes in learning nonsense syllables, 26 minutes in writing from dictation, 28 minutes in addition, 38 minutes in reading, 39 minutes in counting letters one by one, 59 minutes in counting them 3 by 3, and 60 minutes in learning numbers.

Initial Spurt.—The initial spurt in work curves takes place only during the first few minutes of a work period. Kraepelin noted its presence and it has been established by numerous investigations with various kinds of work. The initial spurt usually is completed somewhat before the end of the first 5 minutes. It is explained as due to

the removal of associative interference. It will be recalled that in learning, the initial spurt was explained as an effect of transfer and these two activities are similar.

End-Spurt.—An end-spurt may be expected if the worker is aware that the end of the work period is near. It is explained as due to a change in motivation. Some investigators have reported end-spurts when the end of the work period was not known, but probably these are not true end-spurts, as rhythmical or “chance” variations may occur at any point in the work curve.

Learning in Work.—Learning continues in all work. It seems impossible to achieve maximum learning in any task, however automatic. End-plateaus are passed and new end-plateaus take their places at higher levels. Where fatigue effects are eliminated, learning curves and work curves would differ only in amount of learning. This is because work curves represent psychological activity nearer perfection than learning curves.

Learning is most evident in the early part of work curves. Oehrn used the following formula to distinguish learning in work curves:

$$\frac{(M - m') \times 100}{M}$$

where M is the point of maximum efficiency and m' is a point of minimum efficiency following the *initial spurt* and prior to the point of maximum efficiency. By this formula it is possible to compare learning effects in work curves of different maximal levels.

Fatigue and Motivation.—After learning to a criterion of work has taken place fatigue and motivation are the main influences upon the work and the form of the work curve. There are, of course, such other influences as the working conditions and the morale of the workers. The theoretical curve of work in Fig. 21 represents work as affected by fatigue (and any learning) but as uninfluenced by motivation. Motivation, however, is such a strong influence upon any work, or learning, that it must be accounted for in measurement of work or fatigue or in comparison of curves of work and fatigue.

Fatigue effects in work will be considered now as if other influence were controlled.

FATIGUE

The modern view is to regard fatigue as an altered psycho-physiological state of the total organism during work. A group of scientists, biochemists, medical men, physicists, physiologists, and psychologists, working for the United States Public Health Service² attempted to measure fatigue among interstate truck drivers who had driven from zero to about sixteen hours since they last slept. They were tested with all possible tests and methods of chemical, physical, physiological, and psychological examination. A few of the physiological and chemical tests showed differences accompanying more hours of driving. Many of the psycho-motor tasks were consistently affected by driving time. When the drivers reported how they felt, these feelings also showed changes with driving time. Various of the tests administered are listed below according to the consistency of their measurement in relation to driving time.

1. Consistent change with hours of driving: Speed of tapping, reaction-coordination, body sway, steadiness, vigilance, simple reaction time, and flicker.

2. Less consistent change with hours of driving: Glare resistance, eye movements, aiming, steering efficiency, heart rate, white cell count, diastolic blood pressure, and brake reaction time.

3. No change with driving time: Blood potassium, blood total base, urine pH, differential white cell count, and spacial perception.

4. Slightly stronger with driving time: Strength of grip.

Measurement of Fatigue.—The results above illustrate very well the present situation in the measurement of fatigue. There are three areas of measurement, as follows:

1. Work feelings (subjective fatigue)
2. Bodily change (physiological fatigue)
3. Decrement in performance (objective fatigue).

Results of measurement in these areas will be considered separately.

Work Feelings.—Work feelings are referred to as subjective fatigue or boredom. They are measured by the psychometric method of single stimuli with estimates at various times during work on a scale of possibly as many as 10 units ranging from pleasantness or satisfaction in the work to unpleasantness or dissatisfaction. The usual curve of work feelings for a repetitive mental task drops rapidly with negative acceleration from the very beginning to the end of the work period. But there are wide individual differences in susceptibility to feelings of fatigue and the slope of the curve will vary with the task.

The truck drivers referred to earlier² showed reductions in pleasurable feeling with driving time. Below are percentages according to driving time for those reporting that they were "feeling fine," "feeling fair," and "feeling tired or very tired."

<i>Feeling Reported After Driving</i>	<i>Driving Time in Hours</i>			
	<i>Zero</i>	<i>0.1 = 9.9</i>	<i>10+</i>	<i>Total</i>
Fine	66%	19%	15%	100%
Fair	23%	48%	29%	100%
Tired	2%	48%	50%	100%

The form of the curve of work feelings was originally suggested by Thorndike,³ who based it on the work of 29 adults for two hours in grading printed compositions. Average ratings of "satisfyingness" during the work, which were secured every 20 minutes on a ten-point scale, follow: 4.4, 4.0, 3.6, 3.4, 2.8, 2.6. For 5 individuals performing the same task for a four-hour period, the average ratings of "satisfyingness" taken every 20 minutes were 6.0, 5.7, 5.2, 5.0, 4.6, 4.3, 3.6, 3.3, 2.8, 2.4, 2.5, 2.2. Muscio,⁴ in England, secured a similar curve of subjective fatigue for work performed by medical students and by typists with ratings at various hours of a day's work on a scale of (4) fit, (3) fairly fit, (2) a little tired, and (1) very tired.

The kind of task has the greatest influence upon the slope of the curve of work feelings. This may be considered a motivational effect. The effect on work feelings of different kinds of tasks has been clearly

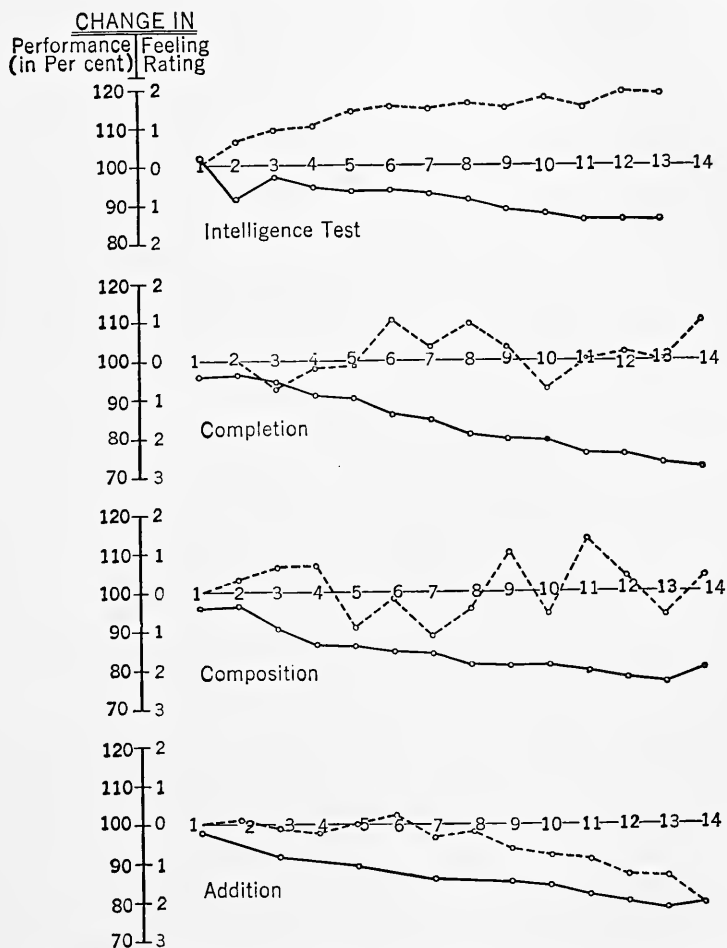


FIG. 22.—CURVES OF CHANGE IN RATING OF "WORK FEELINGS" (CONTINUOUS LINE) AND PER CENT CHANGE IN PERFORMANCE (BROKEN LINE) IN FOUR TASKS. (AFTER POFFENBERGER.)

demonstrated by Poffenberger,⁵ as shown in Fig. 22 where curves for performance (broken line) and work feelings (continuous line) are drawn for four quite different mental tasks. These curves are aver-

age changes for 10-13 subjects from their first record during a five-hour period of work. The performance curves will be referred to later. A seven-point scale was used in rating feeling. For the task of performing intelligence tests the total feeling decrement is only 1.3, whereas for sentence completion it is 2.7, for judging compositions it is 2.3 and for addition it is 2.2.

However expressed, work feelings take the same downward course for a particular task or work. Barmack⁶ secured reports of feelings during the addition of six-place numbers from the same workers on six different scales of "bored—interested," "relaxed—strained," "irritated—pleased," "peppy—fatigued," "sleepy—wide-awake" and "attentive—inattentive." The curves for each of these expressions of work feeling duplicated each other almost exactly.

Bodily Changes.—Fatigue was defined early by physiologists as a chemical condition resulting from accumulated waste products or toxins. This theory was based on experiments showing that during work nerve fibers give off carbon dioxide (CO_2) and heat, Nissl substance of nerve cells is absorbed, there is a reduction of glycogen of muscle fibers, and increases of CO_2 and lactic acid take place in muscles. The theory, however, was discounted by such other evidence as the selection of lactic acid as fuel, in preference to dextrose, by the heart muscle.

Comparing the metabolism of the body as a whole during rest and mental work, the Benedicts and Carpenter,^{7,8} found slight increases in heart and breathing rates, in the elimination of water vapor, CO_2 , and heat, and in the absorption of oxygen. Similar metabolic changes have been reported by various investigators. The study of truck drivers² suggested that changes in white blood cell count and diastolic blood pressure might accompany long sustained effort. But the only undisputed physiological correlate of all work, either physical or mental, is an increase in heart rate. Benedict and Benedict⁸ computed the extra caloric demands of one hour of intensive mental work as being met by one oyster cracker or one-half of a salted peanut! Nothing that has been measured in blood, urine, sweat, temperature, circulation, or respiration changes significantly between rest and work.

Physiological investigations, while illuminating, have contributed little positive knowledge to our understanding of fatigue. It would seem that physiological balance (homeostasis) can be maintained easily in ordinary work, thus accounting for the many equivocal results of physiological studies of fatigue. Oxygen supply, without which work would stop, is maintained by increases in respiration, heart rate, and blood pressure. Other regulative mechanisms, e.g., temperature control, maintain physiological balance and the organism can work continuously without metabolic loss. But if the work is too strenuous, or if the organism has low tolerance, or there are extremely low or high temperatures and humidities, or drugs are affecting the organism, as in excessive sweating of calcium chloride, and so on, the physiological balance of the organism is upset, fatigue is cumulative and progressively rapid, and work stops.

A steady physiological state is usual in work. It would seem that most work could be performed indefinitely as far as any accompanying changes in metabolic processes are concerned. The hope of a physiological index of fatigue has not been realized. Such evidences of fatigue as inaccuracies and blockings occurring in skilled processes appear to be due to anxiety and tension, toward which the study of fatigue has now turned. Fatigue is essentially a psychological and an adjustment or morale problem.

Decrement in Performance.—The usual work curve shows a decrement in performance as illustrated in Fig. 21. This is referred to as objective fatigue or as fatigue effects in performance. The work decrement often appears very early in the work curves. This fatigue effect varies with the length of the work period, for individuals at different times, between individuals at the same time, and with the kind of work. Thus the work curve in Fig. 21 only shows the general tendency in fatigue. This curve is plotted upon averages of individual workers, smoothed for various tasks, where work is continued over a long period of time.

Work decrement is measured by (1) the continuous work method, or (2) the interpolated task method. In the interpolated method, a standard task is introduced at regular intervals during the work and the tested loss is considered to be the evidence of fatigue

in that work. This method is recommended only with highly heterogeneous work, for the influence of the different materials of the test on the measurement of fatigue is uncontrolled.

The continuous method is generally used where the work is homogeneous and allows for frequent measures of efficiency, as in the addition or multiplication of problems of equal difficulty. Oehrns' formula¹ for measurement of fatigue effect, comparable to his formula for learning effect given on page 456, is as follows:

$$\frac{(M - m) \times 100}{M}$$

where M is the point of maximum efficiency and m is a point of minimum efficiency which will be found following the point of maximum efficiency in the work curve.

Such formulas can be used only if the work is highly automatic, where there is little or no learning during the work period. Fatigue may nullify evidences of learning in continuous work curves. The performance decrement of fatigue may be present almost from the beginning of the work period. Yet learning may be keeping the work curve at a higher level than would exist if there were no learning.

A change of Oehrns' formula for fatigue effect, to correct for this, is made by substituting for the measure of maximum efficiency (M) a measure of performance in the same task after a period of rest or at the beginning of the next work period, should it be the same day or the day following. By this technique the effect of learning during the work period in which the fatigue effect is being measured is included.

An experiment by Hylan and Kraepelin⁹ demonstrated how early the performance decrement can take place in mental work. They found an appreciable amount within five minutes in work of addition of one-place numbers. Oehrns¹ has reported fatigue decrements for various tasks during one-hour work periods as follows:

Reading ...	5.9%	Counting letters one by one...	6.2%
Writing ...	8.4%	Counting letters three by three	6.9%
Addition ..	15.4%	Memory for numbers	22.3%

The most important correlate of work decrement, of course, is the length of the work period. This effect is shown in Fig. 23a, which are curves of four days work by Arai,¹⁰ performing mental multiplication of four-place numbers continuously for twelve hours, and Fig. 23b, which are average curves of the four days work by Arai, and the same by Abernethy, Harker and Huxtable.¹¹ It will be noted that all these curves fall rapidly at first and flatten out as the work progresses, as is illustrated in Fig. 21.

Barmack's investigation⁶ shows consistent average decrement for 23 workers, adding six-place numbers, in four different work periods of one to four hours in length, as follows,

<i>Decrement at End of</i>	<i>Per Cent Average Decrement in Work Periods of</i>			
	<i>1 Hour</i>	<i>2 Hours</i>	<i>3 Hours</i>	<i>4 Hours</i>
1st hour.....	0	4	3	3
2nd hour.....	..	9	8	13
3rd hour.....	..	..	14	15
4th hour.....	..	..	..	18

These results fit well the concept of work decrement correlated with length of work period.

Poffenberger's investigation,¹² for which performance curves for five hours of continuous work in four different tasks are shown in Fig. 22, suggests that a slight reinterpretation is necessary of this conclusion. Studies dealing with routine tasks show the typical work curve. But studies with varied tasks may show no decrement in the work curve for quite a period of time and may even show a typical learning curve. In Poffenberger's study (Fig. 22) there was a decrement almost from the initial record in five hours of addition work. This is typical. But in judging compositions upon the Hille-gas Composition Scale and the completion of sentences there was little change in the level of performance for the five hours; and the curve for performance of intelligence tests shows an increment of 20 per cent. Learning or motivation evidently is an influence in varying degrees upon work in different tasks.

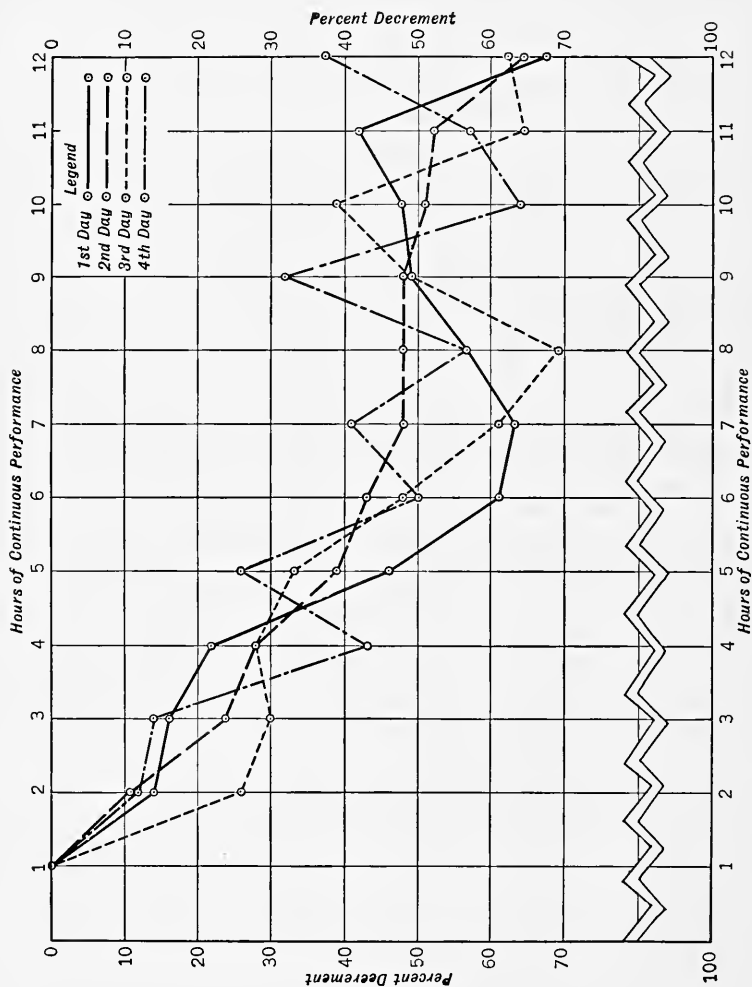


FIG. 23A.—Per cent decrement (ordinate) from first hour for 12 hours (abscissa), during four days' performance in continuous mental multiplication of four place numbers (computed from average time each hour per successful operation). (Arai, 1912.)

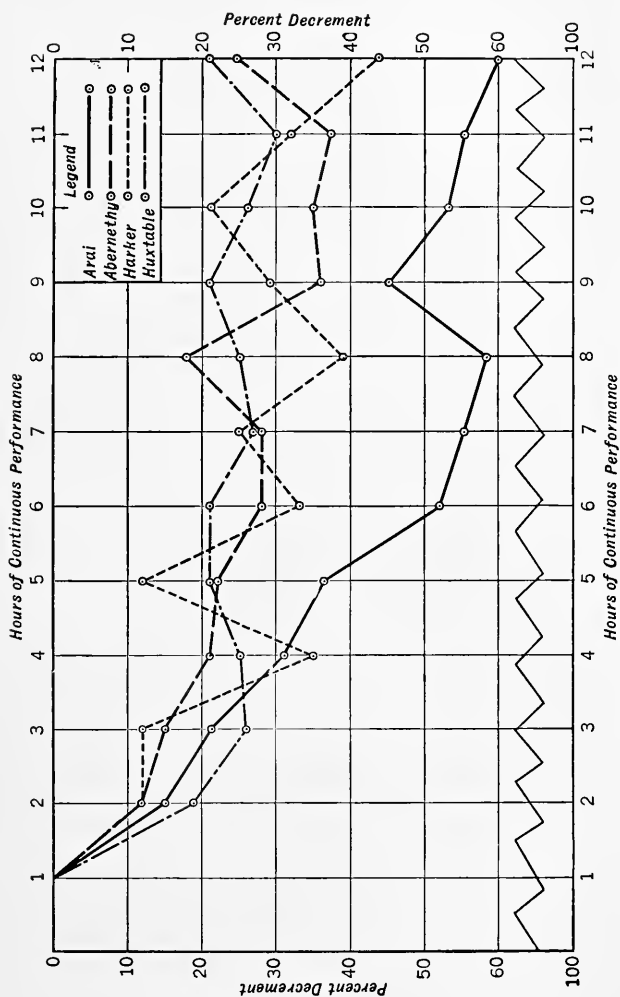


FIG. 23B.—Per cent decrement (ordinate) from first hour for 12 hours (abscissa), averaged for four days' performance in continuous mental multiplication of four-place numbers (computed from average time each hour per successful operation). (Arai, 1912; Abernethy, Harker, Huxtable, 1930.)

Individuals show wide variations in amount of decrement in the same task and when that decrement will take place in a period of work. Rothe¹³ compared the daily record of butter-wrappers by correlating 15-minute records of individual operations during the day's work. Between different individuals working on the same day, the average of intercorrelations was 0.27. Between the same individuals working on different days, the average of correlations was 0.05. These correlations indicate a considerable divergence in shape with time of individual work curves, either between individuals working at the same task at the same time or between the same individuals working at the same task on different days. The daily work curves of Arai, shown in Fig. 23a, illustrate the hourly variations taking place in a routine task. When these curves are averaged for the same individuals for four days of work, as shown in Fig. 23b, there is greater consistency between individuals in the shape of the work curves. Rothe¹³ averaged the records of the same butter wrappers for several days and got an average intercorrelation between individuals of 0.51; between days, where the records of all individuals working on each day were averaged for the 15-minute intervals the average intercorrelation was 0.30. It can not be emphasized too much in one's thinking that the theoretical work curve showing typical decrement is *theoretical*, from which individual and group curves vary greatly. Again, this may be due to learning and motivation.

Motivational Influences.—Any changes in the conditions of work may influence the work curve and its decrement by changing the workers' motivation. The effect on individual decrement of different tasks and of different work days illustrates this. Arai's experiment¹⁰ of continuous multiplication for twelve hours seems to have been performed under fairly constant motivational conditions. She was highly practiced and worked alone. Yet her daily curves differ greatly in relation to time, as is shown in Fig. 23a. Motivational factors probably affect all work curves.

The three investigators, Abernethy, Harker and Huxtable,¹¹ and Arai,¹⁰ performed the same mental task; they were highly practiced

when they began work; and they all worked twelve-hour periods on four different days. But there was one difference: Abernethy, Harker and Huxtable worked together in the same room, subject to the social facilitation of companions doing the same task, while Arai worked alone. Comparable average results for four days of work are shown in Fig. 23b. A significant difference in work decrement appeared between Arai and the three others considered as a group. It is impossible to explain this difference as due to individual differences in withstanding fatigue. The levels of work maintained by the three working together in contrast with Arai working alone implies a motivational effect for the three, counteracting fatigue, through this long period of work. With learning controlled, motivation is seen to have a strong influence upon work decrement.

Correlation with Work Feelings.—While people often regard their feelings as indicative of their fatigue, only occasional correspondence is found between performance and work feelings, as is shown in Fig. 22. Work feelings are less satisfying from almost the beginning of the work in most tasks, whereas work decrement, if present at all, never is found so early in the work period. There may be opposing curves for these two indicators of fatigue.

In Thorndike's investigation,³ performance for two-hour and four-hour periods remained substantially the same, whereas feelings decreased steadily throughout these periods. In Barmack's study⁶ the feeling-tone became relatively more unfavorable along with decrements in performance. In Poffenberger's study⁵ certain tasks had corresponding increments in performance accompanying more unfavorable feelings. No uniform relationship is to be expected between one's performance and one's work feelings over a reasonable period of work.

Recovery from Fatigue.—Curves of recovery from fatigue probably vary with individuals, the extent of the work period, and the nature of the task, as do work curves. Not a great deal is known about the form of curve for recovery from fatigue. But any curve of recovery will probably show rapid recovery at first and negative acceleration in returning to normal, as is illustrated in Fig. 21.

Poffenberger's study ⁵ indicates recovery in work feelings after ten minutes of rest of 77 per cent for intelligence tests, 68 per cent for judging compositions, 48 per cent for addition, and 37 per cent for completion of sentences. It is evident that substantial recovery of normal feeling is rapid, and that it varies in time with the task.

No curve of recovery from the decrement of mental performance has been published. Manzer ¹⁴ has reported the average recovery for various muscle groups exhausted on the ergograph of 82 per cent after five minutes, 90 per cent after ten minutes, and 95 per cent after twenty minutes. Arai ¹⁰ reported the average recovery from ten minutes rest after two hours of continuous mental multiplication of two-place numbers of 74 per cent of the performance decrement. Twenty-one per cent of the performance decrement existed after sixty minutes of rest, which suggests the form of the curve for recovery of efficiency in performance. Poffenberger ¹² found only 40 per cent of the decrement in performance recoverable after ten minutes of rest from five hours of addition.

From this and other evidence it would appear that the curve for recovery from the decrement in mental performance usually will be negatively accelerated, it will have a large proportion of the recovery for short spells of work taking place within ten minutes—possibly a recovery of 75 per cent of initial mental efficiency. This is the basis for the theoretical curve of recovery from the fatigue shown in Fig. 21.

REST

Rest is regarded as the antithesis of work or as the inhibition of psychological activity. Physiologically, it is referred to, often, as a period of metabolic recuperation. In terms of mental measurement it is a state of recovering of satisfactory work feelings or from decrement in performance. It is accomplished by a change in activity or by relaxation or sleep.

Rest-Pauses.—Interpolated periods of relaxation in spells of work are called rest-pauses. Generally speaking, they have a bene-

ficial effect upon the continued exercise of any mental or physical activity. Both learning and work are influenced by them.

During Learning.—The fact that interpolated rest-pauses during the learning period have a beneficial effect on the learning has been called the “Law of distributed practice.” The influence of rest-pauses was noted in the early research of Ebbinghaus in the learning of nonsense syllables. Various investigators of both verbal and motor learning have indicated their beneficial effects. If plateaus in learning curves may be considered as resulting from fatigue counteracting learning, as they may well be, rest-pauses cause recovery from fatigue for they remove the plateaus. Rest is an important factor in efficient learning.

Distributed practice, which is a form of interpolated rest-pauses, may affect immediate and delayed recall differently. Austin¹⁵ reports that five readings of logical material (history and economics) distributed over five days was three times as efficient as five readings in one period for free recall two weeks or one month later. This is the expected effect. But he reports that both were equally efficient when tested for immediate recall.

Optimum intervals between practice periods and the number of trials desirable per practice period have been determined for various learning materials. For example, Hardy¹⁶ has shown in learning the stylus maze that specified practice separated by four-day intervals is more advantageous than when separated by shorter intervals of twelve hours, or of one, two, and even three days. Lashley¹⁷ found that an equal amount of practice of archery distributed in 5 to 12 trials a day was more beneficial in the learning than when distributed in 20, 40, or 60 trials a day.

The kind of activity composing the rest-pause has an important influence upon the learning. Robinson¹⁸ has demonstrated that those activities of the rest period that are most like and most unlike the learned activities affect later recall of the learning the least, and that rest time activities between these two extremes inhibit recall of the learning in relatively greater amounts. This is known as retroactive inhibition. It is generally accepted that complete relaxa-

tion is most beneficial as a rest-pause. Jenkins and Dallenbach¹⁹ have shown that about twice as many nonsense syllables are recalled after various hours of sleep as compared with similar waking intervals.

Rest-Pauses in Industry.—A vast literature has been accumulated upon the effect of rest-pauses in industrial processes, a topic surveyed in Chapter XVII. The general benefits from adequate rest for maximum production are clearly appreciated in personnel administration. Investigators of the Industrial Health Research Board of Great Britain have found that unauthorized resting time among industrial workers is ten or more minutes an hour, which suggests the necessary time of desirable rest-pauses. The voluntary rest-pause is more beneficial than that imposed by the conditions of the work. Various kinds of work require a different distribution and length of rest-pauses. It is likely that rest-pauses will benefit more the less efficient workers. Industrial work of a monotonous character, or work requiring constant attention and judgment, or heavy work, or work requiring continuous sitting and standing, or repetitive work, generally benefit from rest-pauses. The beneficial effect is noted in the decrease in feelings of fatigue and in increased production. The expected increase in production for repetitive work, according to Wyatt,²⁰ the outstanding English authority in this field, is between 2 and 5 per cent. Wyatt states that a rest-pause should be introduced at the time when the output is shown on the curve of work to be at its maximum.

Mental Work.—No operation can be maintained at maximum efficiency unbroken by rest for any length of time even under the strongest motivation. This has been indicated in the discussion of fatigue. Also, it has been shown that a 75 per cent recovery may be expected after short spells of mental work from a rest-pause of 10 minutes, but full recovery requires a much longer time, possibly hours.

Most of the investigations into the effects of rest-pauses on mental work have been with continuous or repetitive performance. Hylan

and Kraepelin⁹ found that the benefit of rest in addition work is not proportional to its length. Graf²¹ tried single rest-pauses of $\frac{1}{2}$, 2, and 5 minutes duration in one-hour work periods of simple addition. He found that the two-minute length showed the greatest benefit. Trying single rest-pauses of 1, 3, 5, and 10 minutes duration in two-hour work periods, he found that the five-minute length was the most efficient. He established the best time for the single rest-pause as being at the end of the second third of the work spell, or at 40 minutes for the hour period and 80 minutes for the two-hour period. As the number of rest-pauses is increased in a period of work, their length should be decreased to achieve maximum efficiency. It is to be expected that optimum length and distribution of rest-pauses will vary with individual workers and with the nature of the task.

In mental work, as in learning, the activities of the rest-pause will affect efficiency. Wyatt²⁰ reports results of an unpublished study by Jackson in which the gain in performance was measured for different ways of spending a rest-pause of fifteen minutes in the middle of a two-hour period of simple addition, as follows:

<i>Nature of Rest</i>	<i>Per Cent Gain</i>
Complete relaxation in a chair.....	9.3
Uncontrolled rest	8.3
Music	3.9
Tea	3.4
Walk	1.5

Miles and Skillbeck²² found that output in an industrial process was increased 14.2 per cent by a fifteen-minute change of work twice a day. Any change in repetitive activity which requires the re-establishing of working set may have a beneficial effect upon mental performance.

Two essential conclusions can be drawn from the investigation of rest-pauses: First, that they are beneficial for efficiency and happiness in all work, including learning; and second, that the condi-

tions of their use depend upon the character of the task and the capacity and personality of individual workers. The conditions of their use must be determined for each working situation.

Sleep.—Sleep is an extreme condition of relaxation or rest and of lowered physiological activity. Studies with animals indicate that sleep is essential to life. Ten puppies kept awake artificially died within a week. The necessary hours of sleep to maintain normal efficiency among human beings have not been determined. Evidently there are wide individual differences in this requirement. It is possible that some adults can maintain a high degree of working efficiency on 5 hours of sleep in 24 while some require 9 or 10 hours. The normal sleeping time is thought of as one-third of the twenty-four-hour day, or 8 hours.

Sleep and Learning.—Loss of sleep is detrimental to learning, and sleep is beneficial to retention. Weiskotten²³ found an average increase of 57 per cent in time of learning nonsense syllables for period of sleeplessness extending from 16 to 58 hours. The average increase in relearning time was 102 per cent. In the study by Jenkins and Dallenbach,¹⁹ the retention of nonsense syllables after various intervals of sleeping and waking time was as follows:

<i>Hours Between Learning and Recall</i>	<i>Per Cent Recalled After Interval of</i>	
	<i>Sleeping</i>	<i>Waking</i>
1	71	46
2	54	31
4	56	23
8	57	9

We forget because of the inhibition on previously learned material of waking activity. Sleep is advantageous to retention, and sleep just after learning is most beneficial.

Loss of Sleep and Work.—After loss of sleep, individuals report increased irritability, nervousness, and lack of control. Their speech may become tangled and lapses may occur. Distractors are more disturbing. Sustained attention seems more difficult. Feelings of fatigue are materially increased by loss of sleep.

Results of research into the effect of loss of sleep on performance are contradictory. Robinson and Hermann²⁴ have reported no decrease in efficiency of performance in such tests as strength of grip, tapping, aiming, reading letters of the alphabet, and mental multiplication for subjects without sleep for 60 to 65 hours. On the other hand, Lashlett²⁵ has reported reduced efficiency of 10.7 per cent in code writing, 13.8 per cent in addition, 8.8 per cent in pursuit meter readings, 33.8 and 51.8 per cent in ataximeter measures, and 24.5 per cent in the Thorndike intelligence examination with loss of sleep of 72 hours. It seems probable that mental efficiency will be reduced by any amount of deviation from normal sleeping time providing motivation is not developed to overcome an anticipated loss in ability to work.

Probably the chief effect of loss of sleep is one of reduced motivation or the ability to apply oneself to the performance of a task. But individuals rise to the occasion under adequate motivation, and loss of considerable sleep may not affect performance. There is the condition known as mental "second breath" where the individual feels inspired, sleep seems unnecessary, and quality, and possibly quantity, of accomplishment is on an extraordinarily high level. The individual may make demands upon himself beyond those of normal function for periods of days and weeks. The human organism is a most adaptable machine.

MOTIVATION TO WORK AND TO LEARN

Psychologists generally have thought of the causes of psychological activity as originating in and genetically traceable to the tissue needs of the body. The individual learns to discriminate between "good" and "bad," "successful" and "unsuccessful" stimuli of his environment as they satisfy these needs. Thus direction is given individual motivation. Social situations involving prestige,

wealth, authority, appearance, leadership, cooperation, and so on, influence the individual only because of the direction given his motivation in learning to react to the specific stimuli of these situations.

Motivation to learn and to work at adolescent and adult levels is studied as:

- (1) Conscious motivation, observed in intention and mental set.
- (2) Rhythms, noting the influence on work of repeated regular patterns of stimuli, including music.
- (3) Distractors, in which the influences of noise and irregular stimuli are considered.
- (4) Incentives, measuring the effects in performance of such stimuli as reward and competition.
- (5) Atmospheric conditions, noting the general influences of the environment, such as temperature, humidity, and lighting in work.
- (6) Drugs, in which the effects on efficiency of stimulants, depressants, and smoking are determined.

Conscious Motivation.—Scientifically speaking, conscious motivation is an intention or *Aufgabe*, which is the goal of the work; or it is a mental set or *Einstellung* or determining tendency, which is the consciousness of being motivated. The standing broad jumper who is set for a spring is in a state of readiness. After acceptance of the goal or intention to jump the conscious side of his motivation becomes just the “knowing” that he is motivated.

Research upon Mental Set.—Müller and Schumann²⁶ reported the first experiment on mental set in 1889, which is a classic in the study of motivation. They found that after an individual had compared a heavier weight with a standard weight he was predisposed to underestimate a lighter weight when compared with the same standard. This was explained as being due to the presence of a strong *Einstellung* which had developed as the result of previous exercise with the heavier weight. From this it becomes evident that normal sets are necessary for the act of comparing, and the conditions of the set determine the resulting performance. Steffens²⁷ demonstrated that established sets are not transferred from one muscle

group to another, such as the left to the right hand. Müller and Schumann believed that the operation of the set depended upon the worker's awareness of its existence, and Strohal²⁸ showed this to be true. He found by introspective study that a particular mental set was present in consciousness as "impalpable knowing" which continued unchanged as long as the set persisted, and changed as soon as a new set was taken. Thus a characteristic dynamic awareness is necessary to performance, and it is expected that performance will continue unimpeded under the motivation of mental set.

Intention.—For tasks of a low degree of automaticity or in learning tasks or where a frequent shift of operation is required, mental set is insufficient for performance. Specific intention is necessary. No change in performance, no learning, no observation, nothing, except unconscious inertia, ever takes place in psychological activity unless initiated in intention. Automatic performance proceeds under the motivation of mental set, but to change the set requires intention to do so.

Külpe²⁹ investigated the relative value in learning of general and specific intention. Groups of nonsense syllables in different colors, projected on a screen, were learned with four different intentions to observe parts of the material and with a general intent to observe all. The amount of specific material learned with intention to observe it was about twice as much as that learned with general intention to observe all, and the amount of other specific material learned was about equal to that learned with general intention. It was evident that the specificity or clearness of intention determined the efficiency of observation and learning.

A series of experiments by Moore³⁰ illustrates this important point. In one experiment the material to be observed was a selection known as the "Marble Statue" which consisted of 166 words and 67 ideas. Such observation is similar to the reading of literature. Subjects tested were formed into comparable groups with different goals: Group A intended to observe the ideas; Group B intended to count the words; and Group C, the control group, intended just to read the passage. All were tested for recall of ideas and differences between groups were statistically reliable. Group A, which specifically in-

tended to observe the ideas, recalled 13 per cent more on the average than Group C, which intended to read the passage, and 630 per cent more than Group B, which intended to do something else, while Group C recalled 442 per cent more than Group B. A repetition of this experiment with nonsense syllables showed a greater advantage of 68 per cent for the group which intended specifically to learn over the group which intended only to read. In another experiment with colored geometrical forms, Group A, which intended to observe geometrical form, was tested for recall of color; Group B, intending to observe color, was tested for form; and Group C, intending to observe both color and form, was tested for both. The superiority of Group C over A and B was 68 and 43 per cent, respectively, which were statistically reliable differences. A fourth experiment verified these results with colored pictures in which Group A intended to observe pictures and was tested for colors, Group B intended to observe colors and was tested for pictures, and Group C intended to observe both and was so tested. Differences between groups were statistically reliable and Group C recalled 81 per cent more than A and 33 per cent more than B.

Intention is necessary to observation and intention to observe specific material results in improved observation for that material without impairment of general observation. These conclusions are particularly important for mental efficiency. To read, not knowing what specific matter should be remembered, would be far better than to search for nonessential information. But to read with intention to note the specific information related to the problem of study brings far the best results for the same expenditure of time.

Intention and Performance.—Changes go on in the environment about us (concrete stimuli) and instruction may be given to us (verbal stimuli), but they do not affect our performance unless they are accepted or cause the development of intention. Motivation is always initiated by intention.

This is demonstrated in an experiment by Fryer³¹ which showed that performance was more closely allied to intention than to verbal instructions. Subjects were instructed to add columns of figures at a uniform rate. Then, contradictory advice and inviting suggestions

were introduced to disturb this set. Always, any new intentions were developed to support the established set. Any changes in performance that took place were more closely related to the new intentions than to the instructions, and these changes were frequently in the opposite direction to that to be expected from the instructions. Evidently any significant change in direction of motivation is intended.

In another experiment,³² it was found that rate of performance did not vary more than 5 per cent when workers intended to work at a comfortable working speed. This may be the extent of individual variability to be expected among routine mental workers who do not intend to change an established working set. But with workers trained to work with intention not to change rate, such variations were as low as 2 per cent, which implied that any variation in rate is due to the absence of adequate intention to maintain an unchanging rate. Not only will automatic activity continue at about the same rate unless there is intention to change it, but intention can make it more uniform.

The Golden Rule in Mental Efficiency.—Observation, thought, and action depend for direction on individual intention, and the clearer and more defined the intention the more efficient the performance. The foundations of motivation in all mental activity are in mental set, which is the product of the past, influencing the present. Any new direction is gained by intention.

WORKING RHYTHM AND DISTRACTORS

Rhythm is regarded as having a facilitating effect on work and upon work feelings. Distractors are regarded as inhibitory. Rhythms are distinguished as regular stimuli and distractors as irregular stimuli. Such stimuli may be received by any sense department. The breezes of a fan on the pressure spots often are regarded by workers as distractors. Most rhythms and distractors, however, are sensed as sounds and it is with these auditory stimuli that we will deal here.

Auditory Rhythm.—Auditory rhythm is defined as repeated temporal patterns which may vary within themselves in timing,

intensity, or pitch. But the temporal patterns are not necessary to the sense of rhythm. Sensitivity of rhythm is determined by the individual. Highly rhythmic stimulation may not be observed as rhythm at all; and any regularly repeated stimulus, such as the noise of the wheels of a railroad train, may assume various rhythmic patterns according to the individual's training in rhythmic combinations. It was Pavlov's belief that rhythm has its foundation in intervals of time which are fractioned by the pulse waves. But no explanation of the sense of rhythm in the individual has found general acceptance.

Rhythm and Performance.—Environmental stimuli become working rhythms only when accepted by the worker as a part of a working situation, such as in the addition of a column of figures or the assembling of a unit of a machine. Fryer³³ has shown that workers will perform at their own rate, regardless of the rate of an accompanying rhythm, unless they intentionally bring the rhythm into the working situation. But when workers intend to coordinate their working rate and the rhythm rate, it can be done perfectly by those with sufficient rhythmic sense. Evidently any coordination between work and rhythm has to be intended by the worker.

Rates of Working Rhythm.—Probably there is an optimum rate or natural working rhythm. But research is uncertain upon this point. There are wide individual differences in rhythmic sense and some individuals are unable to reproduce temporal intervals at all accurately while others can coordinate with a rhythm perfectly. In direct reproduction of rhythmic patterns by beating with a baton, Gault and Goodfellow³⁴ found that training improved accuracy. When accepting guidance from an external rhythm, some workers perform at rates as high or higher than they can under conditions where they established their own motivation.³⁵ But the temporal coordination and the work are distinct in the worker's awareness, which are directed by separate intentions. This implies that neither the performance nor the coordination can be too difficult or the integration, which depends upon an oscillation of attention, will break down.

Music.—Music has been considered beneficial in work, not because it influences the working rate or because the rhythm is adopted as the working rate, but because it serves as a pleasant distractor. Harrell ³⁶ has shown a preference among adults for regular clicks at a rate of 5.08 per second. But there were wide individual preferences for rates as indicated by a mean variation for the group of 2.49 per second. Industrial workers generally prefer music accompanying their work,³⁷ although there are individual preferences as to the kind of music. A number of surveys have shown that music is liked by employees and that it is desirable for this reason even though it may have no effect on efficiency.

Under certain conditions of monotony and boredom, where the work is simple and repetitive in operation, music has been found to increase efficiency. Kerr ³⁸ shows its influence in increasing production and Humes ³⁹ on reduction of wastage. Students working with music from the radio may gain both greater pleasure and greater efficiency in doing routine tasks. Music can have the function not only of being a pleasant distractor but it can obstruct other distractors.

Auditory Distractors.—Irregular extraneous stimuli may facilitate or inhibit activity, and these effects are due to intention developing when the worker becomes aware of them. A distractor may stimulate one person to greater, and another to reduced, effort. The distracting stimulus is equivocal in its effect on any performance.

Noise.—Noise abatement commissions have been appointed in numerous cities all over the world for the purpose of regulating excessive noise on the theory that noise is detrimental to human welfare. If we are to believe the results of numerous studies, any usual amount of noise produces little effect upon immediate efficiency. Morgan ⁴⁰ tested the effect of various distractors, such as gongs, buzzers, and music, upon a complicated coded task where the reaction was to press the correct telegraph key. The effect of the distractor was a slight decrease in rate of initial performance which was followed by a later increase over the normal rate. With the removal of the distractor there was a decrease in rate of perform-

ance to the normal rate. A series of experiments by Pollack and Bartlett ⁴¹ leads to similar conclusions that on the average a slight initial decrease is followed by a slight permanent increase in performance with distractors. The effect of distractors on efficiency is unimportant.

Introspections of the workers in Pollack and Bartlett's study indicated that an adaptation in attitude took place in order that the intended performance might be maintained. Baker ⁴² reports that the effect of distractors depends upon the attitude of the worker toward them. Different groups of workers were shown fictitious graphs of performance in order to create different initial attitudes. These attitudes predetermined the performance. When the worker believed that noise hindered, efficiency dropped upon its introduction. When the worker believed that noise facilitated, efficiency increased when noise was present. Evidently attitude or intention to maintain expected performance will determine any usual effect on efficiency of distractors.

The workers in various investigations of noise effects report that work with distractors is uncomfortable and unpleasant. Noise is irritating and it produces dissatisfaction. There is little experimental evidence upon this point. But Bartlett, ⁴³ the English authority in this field, believes that the summed effects of distractors, industrially and socially, may be of great significance in spite of the evidence that noise has but a small effect on efficiency. Noise is irritating, aggravating, and causes individual and social unhappiness. It belongs to that large class of unpleasant stimuli, such as putrid odors, light glare, and high temperatures, to which the normal person can adjust and maintain efficiency but which causes dissatisfaction to a degree that people will not endure it except under dire necessity.

INCENTIVES TO WORK

Any extraneous stimulus of which the worker is aware may have a facilitating or inhibiting effect in psychological activity, such as learning, thinking, and performance generally. Environmental stimuli are never expected to hold a one-to-one relation with reaction, or anything approaching perfect correlation. However, by controlling

the varied influences on the work of the individual it is possible to isolate an environmental factor and measure its effect in motivation. Such stimuli as found to have a facilitating effect on behavior are called incentives.

Incentives that have been investigated with human beings will be classified here according to popular nomenclature, as follows: (1) Knowledge of results (K of R), (2) rewards, (3) punishment, (4) praises, (5) reproofs, (6) social facilitation, (7) competition, and (8) cooperation.

K of R.—"Knowledge of results" is information given the learner or worker of his performance. In certain learning experiments by Thorndike and his co-workers, right-wrong statements are made following performance, "right" being regarded as "reward" and "wrong" as "punishment." Used in this sense, reward usually strengthens the learning connections and punishment usually weakens them, which is the expected effect of K of R. When punishment increases the learning, as is occasionally observed, it may be because of the temporal relation of the "punished" connections to the "rewarded" connections. Thorndike⁴⁴ has shown that "punished" connections nearest the "rewarded" connections are strengthened most and those farthest away least.

An experiment by Book and Norvell⁴⁵ shows how work progresses when K of R is given and withheld. Making small letter a's was one task, crossing out letters in Spanish words was another, translating digits according to a code into letters, was a third, and the final task was multiplication. Performance was increased with K of R and reduced when it was withheld in all four tasks; and in making small letter a's the results were as follows:

	<i>Men</i>	<i>Women</i>
Per cent gain when K of R was given following performance without K of R..	15.67	12.03
Per cent loss when K of R was removed following performance with K of R....	12.18	15.08

The total per cent gain when performance with K of R followed performance without K of R was 46.82 for men and 42.27 for women. But when performance without K of R followed performance with it, the total per cent gain was 35.38 for men and 33.34 for women, showing that K of R has a differential temporal effect as an incentive.

Numerous experiments have indicated the effects of K of R upon learning and work with various tasks, such as learning nonsense syllables, making change in money, perception of length of lines, lifting weights, and reaction time. Various kinds of K of R have been used, such as the presentation of work sheets, progress curves, stars for credit, partial and complete information, and general and special knowledge. Knowledge of results increases personal efficiency generally, and in degrees according to the completeness, exactness, and clearness with which the K of R is related in intention to the details of the performance.

Individual Rewards, Punishments, Praises, and Reproofs.—

The effect of electric shock on an individual in the laboratory is not the same as that observed when he is repairing a fuse box at home. "Standing in the corner" is not the same punishment for a child of 12 as for one of 6, or for a girl as for a boy, or for pupils in a private school as for those in a public school, and so on. Any specific punishment for an employee does not have the same effect as for a prisoner. Punishment is not a "unitary" cause of behavior. There are many punishments, and many rewards; various praises and reproofs. Each incentive will differ in kind and its effect is determined by the individual.

Educational theorists from Herbart to John Dewey have advocated the educational principle that reward and praise are stronger motivating forces in life than punishment and reproof. Yet there is not the dichotomy of stimulation that is implied in this educational theory. Among those confined to penal institutions little can be accomplished in determining behavior without at least the threat of punishment, and every mother knows how often she uses reproof or punishment so that her child may conform to accepted forms of social behavior.

Punishment.—The type of punishment will, of course, determine its motivation. Electric shock applied as a punishment has been found generally to increase efficiency in learning and reaction. In Johanson's experiment,⁴⁶ electric shock decreased reaction time 15 per cent and more than twice as much as K of R, which lowered it 6 per cent. But various experiments have indicated that electric shock may vary in its effect according to its intensity. Vaughn and Diserens⁴⁷ reported that fewest trials, least errors, and lowest total time were required in learning a stylus maze pattern with slight shock when none, slight, moderate, and intense electric shocks were administered for errors in the learning. Efficiency decreased with increased shock. According to Rexroad,⁴⁸ the effect of the same electric shock may vary with the individual. It may have an "instructive" effect, as with K of R; it may have an "incentive" effect as shown in greater care to avoid errors; and it may have a "disruptive" emotional effect. Results with other "punishments"—such as bells, pressures, unpleasant tastes, and loss of a desired object—closely parallel those with electric shock and lead to the same conclusions. As a general rule, "punishments" are incentives to learn and to work, but always there are wide individual differences in the effects of the punishments.

Rewards.—Different foods are found to have an individual effect upon different animals. Industrial studies have indicated the different effects of various systems of remuneration, which are reviewed in Chapter XVII. Chase⁴⁹ offered children of ages 2 to 8 a gold star on a record card as a reward for work on a modified dynamometer. With this reward, performance increased, but the improvement was not statistically significant over work with K of R. Leuba⁵⁰ reported a statistically reliable increase in multiplication by eleven-year-old children with the reward of a chocolate bar. Undoubtedly, there are many rewards that will affect the efficiency of performance by people of all ages and levels of training.

Praises and Reproofs.—No line of demarcation exists between rewards and punishments on the one hand and praises and reproofs on the other. But increased variability would be expected with

praises and reproofs because of their greater social implications. The related effects of praises and reproofs can be judged from a glance at the assembled results from studies comparing them:⁵¹

<i>Investigator</i>	<i>Subjects</i>	<i>In Ascendency</i>	<i>Reliable Differences</i>
Chase	Young children	Reproof	No
Gilcrest	College students	Praise	Not reported
Gates and Rissland	College students	{ Praise { Reproof { Reproof { Praise	Not reported
Hurlock	School children	{ Praise { Reproof { Reproof { Praise	No (initial measure) Yes (continuous measure)

In these studies both praises and reproofs usually increased performance, but there is seldom a reliable difference between the increases. This was true in Chase's investigation of performance on the dynamometer. Gilchrist reports an increase of 79 per cent with praise in work in the Courtis English Test, but there was no increase with reproof. According to Gates and Rissland both praise and reproof increased performance only slightly in motor coordinations and color naming. Hurlock reports that initial increases were made by 52 per cent of the control group, 79 per cent of the praised group, and 80 per cent of the reproofed group. But the average increase of the reproofed group on the fifth day over the first day was 16 per cent and of the praised group it was 79 per cent, indicating the more permanent motivating effect of praise upon school children. Other studies show the same trend that praises and reproofs generally are incentives to work, and praise is a little more likely to have the greater motivating effect, particularly over a long period of time.

Some interesting results indicating the influence of differences between the sexes in social training are reported by Eaton⁵² who found that praise decreased steadiness in men and increased steadiness in women and that the steadiness decrease in men with praise was equal to that caused by a short period of exercise in basketball. Likewise, reproof increased steadiness in men and decreased steadiness in women.

Social Incentives.—K of R and even the rhythms and distractors have their social implications. Also, the rewards, punishments, praises, and reproofs are incentives largely because of their social significance. All incentives probably motivate the individual because they are a part of a social pattern of stimulation. But certain incentives are regarded as primarily social stimuli; social facilitation, competition, and cooperation are in this category.

Social Facilitation.—Social facilitation has been defined as the incentive effect of the sight or sound of others performing in similar manner. It was investigated first by Mayer,⁵³ about 1900 in Germany, with mental tasks performed by school boys and various instructions were found to be more effective in group work without competition than in individual work. Allport⁵⁴ found that associations increased while individuals were working in groups; 65 to 95 per cent of the individual workers in a series of experiments produced more controlled associations while working in groups than alone. On the other hand, arguments against selected passages of philosophical writings were greater in number when individuals were working along. The more intellectual the task, the less likely will group work facilitate performance. Also, the group serves as a distractor when the worker is socially handicapped in the task. Travis⁵⁵ selected stutterers for a typical experiment in social facilitation. Instead of 80 per cent of the workers producing more associations in group work, as is reported by Allport, 80 per cent of the stutterers produced more associations when working alone. Thus, a social group may have either a facilitating or an inhibiting effect upon mental efficiency. Which it is will be determined by the attitude or mental set of the worker.

Competition.—Competition may exist when individuals work alone or in groups. Triplett⁵⁶ measured its motivating effect by experiment more than forty years ago and concluded that competition has a definite dynamogenic effect. An experiment by Greenberg⁵⁷ indicates how competition develops in children of ages two to seven years. Two children were seated opposite at a table and took blocks from the same pile for their work of block building. No

competition existed at two years of age, and the children were between four and five years of age before half of them exhibited any competitive behavior. But in about 90 per cent of the six-year-olds, competition was well developed.

Competition and Reward.—The experiment by Leuba⁵⁰ compares the effect of competition with that of reward in doing arithmetical problems among school children. Competition was motivated by public ranking according to performance and reward by a chocolate bar for having accomplished a set task. The average number of multiplications was as follows:

	<i>Competition Alone</i>	<i>Reward Alone</i>	<i>Competition and Reward Combined</i>
Mean performance with incentive	34.6	32.9	38.9
Difference from performance with no incentive	11.0	12.3	15.3
PE of difference	1.7	1.4	1.4

All differences are statistically significant. To secure a chocolate bar the children exceed their "no incentive" record by 42 per cent. The competition alone increased performance 48 per cent. The competition and reward combined increased performance 66 per cent. Thus, this competition was a slightly stronger incentive than the reward of a chocolate bar.

Competition and Cooperation.—Cooperation is interpreted usually as working for the good of a group in competition with other groups. Maller⁵⁸ compared individual and group competition for their incentive effects, using tests of addition performed by 814 children in the fifth to eighth grades in the New York City school system. Average performance in work for self was superior to work for the group, and the difference was statistically reliable. Work for the group was twice as variable and decreased in amount, while work for self was consistently high over a long period of time. When

allowed to choose test scores to apply to group- or self-records, poorer work was given to the group. Similar results have been found in hand printing, in the dynamometer squeeze, and in substituting numbers for letters according to a code, and with workers of various ages and training. All experiments indicate the same general conclusion that the incentive to work for self has a greater and more permanent motivating effect than the incentive to work for a group.

Cooperation.—Maller⁵⁸ found that both working for self and working for the group were superior incentives to ordinary practice work or work with no specific incentive. Usually cooperation is an incentive to work. Hurlock⁵⁹ studied the effect of cooperation among school children in the fourth and sixth grades. The average gain was 41 per cent for group competition (cooperation) over the practice effect as measured in the control group. Hurlock reports that all forms of group rivalry were stimulated by discussion and publicity of the group's achievement, indicating the basis of cooperation in group competition.

Individual Differences in Effects of Incentives.—Wide individual differences in effects of incentives are evident in all group investigations. The older children in a group do not respond to the incentive of competition as do the younger children; nor do the brighter respond in the same manner when competing with duller children of the same age; nor do boys when competing with girls. In the study of Leuba⁵⁰ the slower multipliers improved far more than the faster in the group of school children. Divided into quarters the increases from the no incentive situation to that of the incentive situation were as follows:

	<i>Individual Competition, Per Cent</i>	<i>Reward, Per Cent</i>	<i>Reward and Competition, Per Cent</i>
Lowest quarter	71	92	139
Highest quarter	34	32	36

The same appeal affects workers differently in various industries, plants, labor unions, school years, religions, nationalities, races, and so on.

Social background is responsible for differences in the motivating effect of incentives. Each individual responds according to the social implication of an incentive for him. If an appeal to cooperation has a consistent effect upon group accomplishment, it is because the individuals forming the group have had similar training. All environmental changes affecting the individual, such as noise, rhythms, honors, praises, rewards, and so on, are integrated with the influences of the individual's past. Homogeneity of group training results in similarity of response; heterogeneity causes individual differences in motivation. The individual behavior may deviate little or much from a group norm.

ATMOSPHERIC CONDITIONS

Until about twenty-five years ago it was thought that the reduction in oxygen or the increase of carbon dioxide (CO_2) in air was responsible for the ill effects of poor ventilation. Now we know that air from which dirt and odors have been removed causes no bad results in feelings, health, or efficiency, providing adequate temperature and humidity are maintained. The oxygen content of air is never decreased or the CO_2 content increased to a point affecting the human organism under conditions of the worst ventilation.

The chemical constituents of air are unimportant, but adequate temperature and humidity are of great importance. This is illustrated in an early attempt to understand the situation by Paul,⁶⁰ who confined himself in a small glass cabinet for four hours, breathing the same air over and over again. As long as the temperature was not over 60° F. (and the humidity not more than 72 per cent of saturation) he was without discomfort. With a rise in temperature of 68° to 86° (humidity 72 to 92 per cent), serious symptoms resulted. That these symptoms were not due to lack of oxygen was evident because no beneficial effects resulted from breathing air outside the cabinet. Also, a man outside the cabinet breathed the air within with no ill effects. Similar results were obtained in an experi-

ment conducted by the New York State Commission on Ventilation.⁶¹ It was found that any change in the air that increased the radiation of heat from the body, such as an air current stirred by a fan, was advantageous in high temperature. The ill effects attributed to bad ventilation are due to the inability of the organism to eliminate its own heat owing to high temperature and high humidity.

Temperature.—High external temperature increases metabolism, which will raise efficiency. But when the oxidation and elimination processes of the body are insufficient to carry off its waste products, fatigue will result from their accumulation. This is what takes place under conditions of prolonged high external temperature with its detrimental effect on efficiency. The relation of high external temperature to fatigue is a fact of common observation. Also, a low external temperature causes an increase in metabolic activity in order to maintain normal bodily temperature, with similar effects in increased consumption of energy, accumulation of waste, and fatigue.

There is an optimum temperature for all forms of activity in the various occupations and apparently there are optimum outdoor temperatures for indoor work.⁶² This effect of outside temperature on indoor work may be the result of radiation from the walls of the building. The optimum temperature for mental work, that is, the temperature of the room in which one is working, appears to be about 68° F. with a relative humidity of 50 per cent. But excessive temperature (within a range of 68° to 86° F.) has not been found to affect efficiency in mental performance so long as adequate motivation can be maintained.⁶³ It has a marked influence on comfort, however, and under ordinary conditions high temperatures are expected to lower motivation and thus decrease efficiency.

Humidity.—It is necessary that superfluous heat be eliminated from the body at all times; and humidity, as well as temperature, influences this activity. Increased humidity reduces evaporation and augments the conduction of heat by the air. Thus it has two opposing effects on body temperature: One of increasing the elimination of body heat because of the improved conductivity of the air; and

the other of decreasing this elimination due to slow evaporation of perspiration. Which effect will dominate depends upon temperature. With temperatures below 60° F., where perspiration is at a minimum, high humidity has a cooling effect. With temperatures above 70° F., high humidity checks the evaporation of perspiration (and also the elimination of water vapor from the lungs), which has a warming effect on the body. A neutral zone for effects of humidity on the body exists at temperatures of 68° to 70° F.

Investigations show surprisingly little effect of different humidities, as with different temperatures, on mental work. Any bad effects of ventilation are upon mental attitude in the form of discomfort which affects motivation to work. Very high humidity with low temperature makes one feel chilly, and high humidity with high temperature causes oppressive feelings of heat.

Illumination.—The essential requirement of good illumination for mental or physical work is an even distribution of light, such as is gained in indirect lighting. Intensity of illumination within wide limits is relatively unimportant. This is explained by the fact that the eye has great power of adaptation, with a ratio of 1 to 10,000 at threshold. The important point in good lighting is to reduce the frequency of necessary adaptation. As the eyes seldom maintain the same focus within the field of work it is of advantage from the point of view of minimum fatigue that the total visual environment be of approximately the same intensity of illumination. But there are minimum and maximum intensities of illumination for greatest efficiency and least fatigue in different occupational tasks, as would be expected. The main disturbing factor to vision, as measured in loss of efficiency and fatigue, is glare and contrasting light intensities over the field of work. These factors are avoided by using uniform artificial or natural illumination.

DRUGS, STIMULANTS, AND SMOKING

Extensive propoganda and widespread partisanship exist concerning the moral, mental, and physiological influences of alcohol, tobacco, caffeine, strychnine, and other drugs. The actual effects of

drugs and stimulants can be determined only by scientific experiment. But investigation is exceedingly difficult. Suggestion must be controlled, for the subject in an experiment will have any expected effect if he knows he is taking a drug or smoking tobacco. The drug must be disguised, neutral substances of the same taste and odor must be substituted as controls, smoking tobacco must be checked against smoking hot air of the same taste and odor, and so on, if results approaching the truth are to be expected.

All of this has been done and yet it is difficult to establish reliable effects. Motivation may change in an experiment in which a subject knows that he is ingesting an experimental substance. The human organism will adjust to any ordinary conditions and perform normally if at all possible. Yet from the confusion of results of experiments, certain tentative conclusions can be drawn concerning the effects of drugs, stimulants and the smoking of tobacco upon individual efficiency.

Strychnine.—It is popularly believed that strychnine is a stimulant, but any stimulating effects of strychnine are due probably to the selective action of a poison. The effects on the body are thought to be confined largely to the lower nerve centers. It is said that strychnine lowers resistance at the synapse. Undoubtedly, suggestion plays a part in any influence credited to small doses of strychnine in the facilitation of performance.

Caffeine.—Caffeine is a true stimulant, which is not cumulative in its effect, nor is the stimulation followed by a depression. The effect of caffeine is of special interest because it is present in coffee, tea, and certain soda fountain drinks. The usual large cup of coffee or of strong tea contains about 2.5 grains of caffeine, which is a small dose as measured in its effects upon efficiency.

Hollingsworth's study of caffeine ⁶⁴ is a classic in the field, and it indicates the effects of various doses of the drug ranging from 2 to 6 grains over 72 hours of tests. Caffeine was found to be a stimulant to speed of movement and this effect appeared within one hour and lasted from one to four hours according to the size of the dose. Even small doses caused a slight loss of muscular steadiness, but with a

dose of 6 grains this effect was tremendous (583 per cent) and increased over a period of several hours. It was greater than that resulting from a large dose of alcohol. In tests of naming colors, naming opposites, and simple addition, all doses acted as approximately equal stimuli to performance, lasting from three to seven hours. In tests of speed of perception, speed of cancellation, and speed of discrimination (reaction time), the larger doses acted as a stimulant after two hours which lasted until the following day. For most of the sixteen subjects tested by Hollingworth, doses of one to 4 grains did not affect sleep at all, but with a dose of 6 grains the sleep of practically all was disturbed. Taken on an empty stomach, the drug had the greatest influence. Subjects of lightest body weight were affected most.

Such results imply that caffeine acts as a long-period stimulant upon most performance, and the stimulation varies according to the size of the dose and with the individual. One or more cups of coffee are as effective in dispelling a headache as headache powders which consist essentially of caffeine. The popular notion that an after-dinner cup of coffee will cause insomnia is erroneous, and the reason for sleeplessness on such an occasion is not because of the small amount of caffeine consumed, but rather the excitement of the evening or the suggestion that one cannot go to sleep after drinking coffee.

Benzedrine.—Less is known about benzedrine sulphate, but it seems to have an effect on efficiency similar to that of caffeine with one difference. It increases steadiness, rather than decreasing it as does caffeine. Tests of the effect of benzedrine seldom show detrimental effects of any kind. Benzedrine usually increases efficiency; and it delays for a considerable period the onset of the discomfort normally resulting from sleeplessness.

Thornton, Holck, and Smith⁶⁵ compared the effect of caffeine and benzedrine on 9 psychomotor tasks: Steadiness, two tests of auditory reaction time, visual choice reaction time, 3 tests of tapping, and 2 tests of grip. Capsules of 300 milligrams of caffeine sodium benzoate, 20 milligrams of benzedrine sulfate, and of lactose

were administered in indiscriminate order and the performance with the drugs compared with that with the lactose. All subjects did better with benzedrine than with the control, and they did better in most tests than with caffeine. All subjects did better with caffeine than they did with the control except in the steadiness test, where there was the usual decrement in performance.

Smoking Tobacco.—Nicotine is popularly assumed to be the drug present in tobacco smoke, but it is doubtful if it exists in smoke at all except possibly from a rapidly smoked cigarette. Busch⁶⁶ has shown that a large number of toxic substances may be present in tobacco smoke and it is possible that pyridine, which was found by Busch in all tobacco smoke tested, may be its principal toxic substance. Blood pressure is increased and heart rate is stimulated uniformly by tobacco smoking. Digestive secretions are stimulated. Habitual users do not establish a physiological tolerance for it.

Tests of Motor Function.—Hull's experiment⁶⁷ is interesting not only because of what he found out but also because of the manner in which he handled the control tests. He used a pipe heated by an electric coil for the control smoke. The subjects, divided equally between nonsmokers and habitual smokers, were blindfolded during the smoking and smoked a tobacco loaded pipe, or the control pipe, for 25 minutes on alternate days. They did not inhale. A complete series of tests including 4 of neuro-muscular processes, 4 sensory motor tests, and 4 of the higher mental processes, were administered prior to the smoking and repeated 3 times with intervening rest periods of five minutes following the smoking. Results were compared for the tobacco smoking days and nonsmoking days for nonsmokers and habitual smokers. Mentioning here only the results upon motor functions, no significant difference in rate of tapping was found by Hull following the smoking of tobacco, which agrees with results from other investigators. But steadiness was significantly decreased by smoking both for habitual smokers and for nonsmokers, which again is in agreement with conclusions from other investigators that smoking decreases precision of voluntary move-

ment. This is the only unquestioned effect of smoking on motor activity.

Statistical Studies of Efficiency.—Statistical studies, of which there have been many reporting differences in academic standing, intelligence, learning capacity, athletic prowess, weight, height, death rate, lung capacity and so on, between smokers and nonsmokers of tobacco, are subject to errors due to sampling. For this reason the conclusions drawn from most of them are open to question. Always it must be borne in mind that smoking may be a symptom of other conditions responsible for the difference reported. The same may be said of statistical studies of users and nonusers of alcohol and drugs. While it is reported for college students, for example, that nonsmokers are superior to smokers in scholarship, this is merely a correlation and not an indication of a cause. Low academic standing likewise is related to greater social activities and greater social activities are related to greater smoking.

It is popularly agreed that smoking retards development and is injurious to the health of adolescents, but proof of this is lacking. Pearl⁶⁸ has shown that the death rate for various ages is definitely higher for heavy smokers than for moderate smokers and nonsmokers, and there is not much difference between moderate smokers and nonsmokers. But Pearl's samples for age groups are small, and probably any differences indicated are not statistically significant. Pack⁶⁹ studied 248 football men in 14 institutions, defining smokers as "habitual user when not in training," and he found that smokers of the same age and averaging 3.3 pounds heavier had a lung capacity of 7.3 per cent below that of nonsmokers. Excessive smoking may reduce lung capacity, explaining the shortness of breath of the habitual smoker. It is interesting that, among college populations generally, smokers exceed nonsmokers in physical measures, which may be because they are older or because those who smoke are more likely to engage in developmental physical exercise.

Smoking and Mental Performance.—Smoking has little effect upon mental performance, with the possible exception of repetitive activity, such as addition. In Hull's study,⁶⁷ speed of adding was

decreased significantly in all tests when nonsmokers were smoking and increased significantly for habitual smokers. The per cent losses for nonsmokers were 2.48 (after 4.5 minutes), 3.18 (after 39.5 minutes), and 2.61 (after 1 hour and 14.5 minutes). For habitual smokers the per cent gains were 3.47, 5.03, and 7.19, respectively. Accuracy seemed not to be affected materially by smoking among either the habitual smokers or the nonsmokers. This is an interesting result which is in agreement generally with other investigations. While the experimental evidence favors a slight improvement in rate of ordinary routine mental performance when the smoker is accustomed to smoking, where new associations are concerned, as in learning, there may be a slight inhibition on mental activity following smoking even by habitual smokers.

The Motivation for Smoking and Drinking.—Janet,⁷⁰ the eminent French psycho-pathologist, says that the inebriate drinks alcohol because of the need to face the realities of life. In psycho-analytical theory, alcohol is desired because it removes inhibitions and destroys sublimations—it is a submerger of life's conflicts. Juliusberger⁷¹ gave this as the explanation for the frequent relation found between alcoholism and sex exhibitionism, homosexuality, incest, abuse, crime, etc. Such theories have been derived from a study of mental abnormalities. Smoking and drinking alcoholic beverages are common social phenomena, existing world-wide and among both primitive and civilized peoples. People drink alcohol to remove feelings of fatigue, to intensify conscious states, to forget the hectic business problems of the day, to gain social ease, to enjoy better a meal, to be exciting in conversation, to go to sleep easily, and because they "like the feel of it." Similarly, people smoke tobacco because it aids digestion, brings the social group into greater *rapport*, gives a mental lift, and provides the atmosphere for contemplation. Patrick⁷² says that drinking alcohol is a means of achieving relaxation in a complex social environment. This is as satisfactory a general theory for both smoking and drinking as can be given. But there are many motives for different individuals to drink or to smoke, as there are for most expressions of human behavior.

Alcohol and Performance.—Experimentation into the effects of alcohol upon mental and motor efficiency generally leaves no doubt that alcohol is a physiological and psychological depressant. Heart action and respiration are increased, and alcohol must be excreted from the body, as are other poisonous drugs, with the exception of about 2 oz. daily which are oxidized similar to starches and sugars. Work appears to be performed with greater ease, but the objective record indicates a decrease in efficiency. These are the conclusions of research from its very beginning. Kraepelin⁷³ reported that large doses caused both an immediate and long period decrease of efficiency in the mental processes of apprehension, memory, and judgment. Rivers⁷⁴ reported decreased efficiency in operations such as type-writing and mental multiplication. While early workers had suggested an initial stimulation of mental and motor activity by alcohol, this is explained as an incentive effect from expectation.

Dodge and Benedict⁷⁵ have reported from extensive research into the physiological and psychological effects of alcohol that latency of reaction in the knee-jerk increased 10 per cent and muscular thickening decreased 46 per cent following a dose of 30 c.c. of alcohol. In the protective eyelid reflex, latency was increased 7 per cent and extent of movement was decreased 19 per cent. Sensory and motor measures were decreased in efficiency with the same dose as follows:

Sensory threshold to electric stimuli.....	14 per cent
Speed of eye movements.....	11 per cent
Finger movement (tapping).....	9 per cent
Eye reaction-time	5 per cent
Speech reaction-time	3 per cent

Memory and free association were only slightly affected in the direction of decreased efficiency with a dose of 30 c.c. or 45 c.c.

Hollingworth⁷⁶ has extended the study of the effects of alcohol among mental activities. Likewise, he finds no facilitation of performance with various doses of alcohol. His technique is interesting. Beer was administered in doses of 3 to 4 bottles, 5 to 6 bottles, and

6 to 9 bottles, and the alcohol was extracted from the beer for the control period. A bottle of beer contained 13.14 c.c. or 10.37 grams of alcohol, and so Hollingworth's doses were larger than those used by Dodge and Benedict. Six tests of various functions were administered during a three-hour period of work in the morning and 6 during a similar period in the afternoon following the administering of the beer at noon. Results for various tests are given below in terms of per cent loss for the afternoon of the morning performance:

	<i>No. of Bottles of Beer</i>		
	3—4	5—6	6—9
Steadiness of hand	—68	—241	—370
Tapping (speed)	— 7	— 13	— 14
Coordination of eye and hand	— 6	— 10	— 20
Color naming (Woodworth-Wells)	— 2	— 7	— 12
Opposites (logical relations)	— 5	— 12	— 23
Adding	—10	— 15	— 16
Substitution (Woodworth-Wells)	— 4	— 9	— 6
Memory for paired associates	—21	.....	— 60

The effect of small doses on the associative processes had disappeared by the last test three hours after administration of the dose. But in the case of such motor processes as tapping, steadiness, and coordination, recovery was slower even with the smallest doses.


The loss in efficiency usually is correlated with the amount of alcohol in the system. As concluded by Dodge and Benedict similar functions are similarly affected. Reflex activity and motor activity appear to be detrimentally affected in greater degrees than the higher mental activities. The recovery of reflex activities was found to be most rapid by Dodge and Benedict. Recovery of motor activities generally was found by Hollingworth to be slower than intellectual activities.

It is interesting that steadiness is detrimentally affected considerably by most drugs including smoking. Benzedrine is the outstanding exception; it improves steadiness considerably. There are wide individual differences in the effects of all drugs, stimulants, and the smoking of tobacco.

MORALE AND SOCIAL LIVING

Individual well-being in social living describes what is usually meant by morale. Morale is not a unique psychological trait but a concept of adjustment between the individual and society. Broken down according to social situations, such as industrial morale, community morale, college morale, Army morale,⁷⁷ and national morale, individual morale is the satisfaction gained in contributing to the life of the group.

What Research Indicates.—Various researches⁷⁸ indicate under what conditions high morale can be expected. High morale is more likely to be present in the individual who is:

- 
- In good health;
 - Superior in education;
 - Efficient in habits of work;
 - Superior in economic or occupational status;
 - Realistic in point of view;
 - Satisfied in his emotional and social contacts; and
 - Respectful of authority and leadership.

It will be noticed that these are all matters of well-being in social living. Future research will probably indicate other relationships with high morale; also, it may break these down into more specific activities of social life. Such results as these have been used in establishing the components or psychological factors for the measurement of morale.

Measurement of Morale.—Morale is measured in terms of the attitudes developed in the social situation under consideration. Certain components composed of these attitudes are selected as they are related to the situation and an instrument for measurement is constructed around them. For example, the Morale Services Division of the Army Service Forces of the U. S. Army during the last war outlined the following seven components for the measurement of Army morale:

Faith in the cause and the future;
Pride and confidence in the outfit;
Belief in the mission;
Confidence in training and equipment;
Realistic appraisal of the job ahead;
Satisfaction with job assignment; and
Belief in the Army's concern for individual welfare.

Attitude scales of multiple choice items representing these components were administered generally to troops throughout the Army to determine the morale of various commands. It was found, for example, that scores in all seven components were related to respect for leadership and this fact emphasized the need for better training of officers. Similar examples of measurement of morale are found in the U. S. Department of Agriculture, in industry, and in public opinion polling. Factors usually tapped in an industrial survey of morale are:

Feelings of common ownership with management;
Feelings of economic security;
Recognition of fair competition;
Satisfaction with skillful accomplishment;
Feelings of group acceptance; and
Confidence in leadership.

Developing Morale.—Each social group to which a person belongs has a distinctive morale. Its members have a similar frame of reference in looking at things. Industrial workers, clerks, doctors, politicians, etc., have a characteristic set of attitudes and interests which unify them into a social group.

The growing individual learns the morale of the group, or groups, to which he will belong, just as he learns his skills. The skills he learns come from the group as do his attitudes. The theological student learns his form of worship along with his beliefs about it. The brick layer learns his trade along with the opinions and rules for its use. The soldier learns the ways of fighting along with the ideals for which he will fight. Morale and efficiency are integrated through

training in forming the individual's personality. Each social group exists because of common morale and skill of its members.

Social Value.—The individual's well-being depends upon the strength of the social group. Neither can be sacrificed for the other. The group cannot demand of the individual more than he can give and maintain his morale—at least not over an extended period. Nor can the individual demand satisfactions at the expense of the group. Group benefits and individual satisfactions in social living are subject to the checks and balances of individual upon group and group upon individual.

SELF-DIRECTION

Psychological activity is performed with the various tools of human expression, with motor tools of skillful coordination as in the manual occupations, with verbal tools of linguistic and mathematical habits as in speaking and lecturing, and with imagery and symbols as in thinking and mental work generally. Mental set contributes any determination of this activity from earlier training. Thinking is directed awareness, and performance is planned motor or verbal reaction. These are intended activities and differ only in the tools of their expression. Efficiency results from the perfection of mental set in all activities and morale from its adjustment to social life.

William H. Burnham,⁷⁹ a pioneer mental hygienist, believed that the essential conditions for the development of normal mental activity in the individual are a task, a plan, and freedom—freedom to choose one's tasks in life and to plan their development. It is the purpose of education to provide the tasks which can be accomplished by the individual, and the purpose of educational guidance to offer the stimulation for their choice and development. The individual must have freedom of choice if he is to avoid the disturbing inhibition of abnormal mental activity. This is what a democratic education means.

To know that one can do a task and to do it with superior advantage among one's fellows is accompanied by the social poise of orderly mental activity and the self-control of purposeful inhibition. Often it is not necessary that what one does be acceptable

to the social group as long as self-recognition of its importance exists. But this is borderline territory where only the genius can avoid being regarded as abnormal. The adjustment necessary to high individual morale usually involves both self-recognition and group recognition of personal efficiency.

Mental activity in individuals of high personal efficiency is easy flowing—whether in thinking or performance. The tools function smoothly. The activity is directed toward a goal, which is carried as intention or mental set according to the degree of automaticity of the activity. Inhibition or interference is exceptional. Haste is habitually avoided, as is waste. Periods of rest or relaxation to offset fatigue are interpolated with the task. A program or routine of considerable regularity is recognized as desirable. So is observed the social poise of orderly mental activity in learning and work. Such a development is a preventive of fatigue or mental disturbance as it is sustaining of morale.

The purposeful inhibition in self-control is a positive function. Inhibitions accompany high personal efficiency. They are the interference of directed activity upon other activity. Fatigue, which inhibits efficiency, is inhibited by rest. Reaction to the ever-present inhibits dreaming. Bursts of anger and fear are inhibited by efficient coordination. The energy of emotion is given direction by a goal. Courage may be regarded as behavior trained in a certain direction. Positive thought and action are without cowardice. To kick at nothing is wrenching; and in mental activity, responding inadequately is just as disturbing. So it is with negative inhibition, which is the interference of other activity upon that intended. In all fear or inferiority or fatigue there is lack of adequacy of expression as evidenced by abortive reaction and imaginary evils which never exist in coordinated behavior. Efficiency, which is free from the handicap of negative inhibition, avoids the dilemma of maladjustment. Upon such efficiency is developed well-being or morale in social living.

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CHAPTER XVI

VOCATIONAL PSYCHOLOGY (FITTING THE WORKER TO THE JOB)

By MORRIS S. VITELES, *University of Pennsylvania*

The Objectives of Vocational Psychology.—In its vocational applications, psychology seeks (1) to increase industrial efficiency; (2) to promote the adjustment of the worker;¹ (3) to further industrial stability by eliminating sources of grievances and misunderstandings between workers and employers.²

MATCHING MEN AND OCCUPATIONS

The Scope of Vocational Guidance and of Vocational Selection.—These objectives are achieved, in part, by the application of psychological methods in *fitting workers to jobs* through (1) *vocational guidance* and (2) *vocational selection*.

The aim in vocational guidance is to discover the most suitable occupation for a given individual. In vocational selection, the objective is to choose the most suitable individual for an available job. Although there are differences between the immediate objectives of vocational guidance and vocational selection, the two frequently overlap. In a plant where many varied jobs are available, the process of placing an applicant on the job for which he is best adapted may take on some of the characteristics of guidance. In an area where there are only a few industries and few distinctive occupations, vocational guidance consists largely of informing the young man whether he is better fitted for one or another of these restricted occupational opportunities.

An illustration of the parallel functions of vocational guidance and vocational selection is found in the experience of the United States Employment Service. Between July 1, 1933, and June 30,

1938, over 33 million individuals seeking work registered at its offices. Of these, approximately one-fourth were young people between the ages of 16 and 25 who had little or no work experience. Another larger group consisted of older workers displaced from occupations and industries in which there was no current demand or prospect of employment. In the case of both groups, it became necessary for the Employment Service to make a thoroughgoing analysis of the aptitudes, interests, and other characteristics of the applicants to facilitate placement in occupations for which they are adapted. The problem here is essentially one of guidance, rather than the narrower one of helping employers to select competent workers originally conceived to be the function of an Employment Service.

Technical Aspects of Vocational Guidance and of Vocational Selection.—Not only is there overlapping in the scope of vocational guidance and selection, but there is marked similarity in the techniques employed by both. A General Aptitude Test Battery, such as that recently developed by the United States Employment Service, which provides information about an individual's aptitude for a large variety of occupations, is useful not only in vocational guidance, but also in the differential classification of applicants for employment in a plant seeking workers for a large variety of jobs.³ In every respect, vocational guidance profits from experience and research in the field of vocational selection, and vice versa.

In both vocational guidance and vocational selection, the application of psychology in the improvement of techniques takes the same form, namely: (1) The development of *better methods of occupational analysis*; (2) the preparation of *better techniques for the analysis of the individual*; and (3) the formulation of *sound methods for integrating the information about occupations with the information on the individual* with the view of effecting a satisfactory adjustment between the demands of the job and qualifications of the individuals.

PSYCHOLOGICAL METHODS IN OCCUPATIONAL ANALYSIS

Analysis of Occupational Requirements.—The satisfactory adjustment of an individual to a job requires a consideration of its

requirements in the way of physique, health, aptitudes, interests, education, skills, temperament, character, and other important characteristics. Knowledge of these requirements is obtained by *job analysis*, which is the study of the job designed to reveal its duties, conditions of work, and the qualifications that a worker should have for efficient performance and adjustment on the job. Facts uncovered in the job analysis are generally embodied in a *job specification*.

The Psychological Approach in Job Analysis.—The chief contribution of psychology to job analysis consists of techniques for the determination of the traits required by the job and for describing them in specific, objective, and quantitative terms. The traditional job specification is largely confined to a statement on duties, tools, methods, and working conditions, supplemented by a brief description of such personal requirements as age, sex, health, education, and perhaps specialized skills. For vocational guidance and selection there is needed a full description of the aptitudes and other characteristics which underlie skill, satisfaction, and success on the job.

At times, a description of such traits is included in the job specification, but, generally, when included, there is no exact definition of the traits or statement of the extent to which each is necessary for job success. For instance, in describing the qualifications of street car motormen and conductors one study⁴ states that they should be "mentally alert," but no attempt is made to define the nature of mental alertness or to indicate the amount required. "Good disposition" is given as another qualification of the motorman and conductor, but just what this trait means and how it can be measured are not indicated. "Motormen and conductors," it is added, "must be level headed, cool and resourceful," but it is left entirely to the fancy of the reader to determine what is meant by these traits.

Viteles Job Psychographic Method.—Among psychological procedures used in analyzing and recording such specialized requirements for occupational success is the *Viteles Job Psychographic Method*.⁵ This starts with a list of 32 "abilities" (listed in Fig. 24), each carefully defined to indicate its scope of function in occupational activity. The following is a typical definition:

COORDINATION (B). *This refers to the harmonious combination of visual and muscular functions on the job. It is movement controlled by sight. It is important, for example, in such a job as telephone operating, in which the operator is required to place a plug into a hole of small diameter, the location of which is perceived through vision. At the other extreme is that of selling life insurance, in which Coordination B is a negligible factor.*

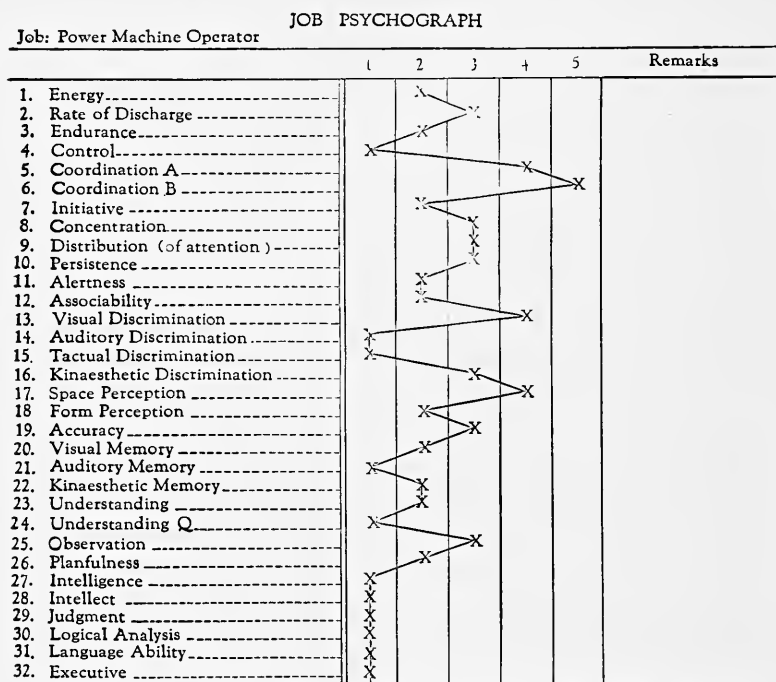


FIG. 24.—JOB PSYCHOGRAPH FOR POWER MACHINE OPERATOR.
(From Otis and Smith.)

The psychographic method also provides a standard 5-point scale for rating the *importance of each ability on the job*. The units in this scale are: (1) *Negligible*, (2) *barely significant*, (3) *significant*, (4) *of great importance*, (5) *of utmost importance*.

Ratings are graphically recorded on a form such as that shown in Fig. 24, as part of the job specification for "power machine operator," to produce a job psychograph which shows at a glance the

abilities that are most essential to success and their general relation to each other and to less important abilities. There are indicated on such a job psychograph the keystone specific abilities which must be particularly considered and objectively measured in vocational guidance and selection. The preparation of the job psychograph, as the compilation of other facts about the job, requires intensive study of the job by trained observers, supplemented by the judgment of workers, supervisors, and others thoroughly familiar with the job.

An important feature of the job psychographic method is that it facilitates a preliminary grouping of jobs with similar patterns of abilities into families of occupations which are alike in mental requirements, although diverse in terms of specific tasks performed and even of material handled. For example, a study of clerical jobs by the author in 1922 revealed that the same job psychograph could be employed as a basis for hiring for seven distinct jobs because of the similarity in the underlying pattern of abilities required for success in all. The importance of such grouping becomes strikingly apparent when it is recalled that there are in the *Dictionary of Occupational Titles* approximately 22,000 defined jobs known by more than 40,000 job titles.^{5a} Until these are classified in terms of common aptitudes and other characteristics, job seekers cannot be considered for the full range of opportunities matching their specific characteristics.

Adaptations of the Job Psychographic Method.—Variations of the job psychographic method developed by other investigators have been widely used in European countries. In this country, the United States Employment Service is using a modification of the Viteles Job Psychographic Method in studying occupational requirements.⁶ The terms originally used by the author are replaced by descriptive phrases such as:

1. *Work rapidly for long periods.*
14. *Perceive form of objects.*
33. *Attention to many items.*
36. *Tact in dealing with people.*

The number of traits listed on the U. S. Employment Service *Occupational Characteristic Check List* has been extended to 47,

including a few traits of temperament or personality as well as "abilities" to which the job psychograph was originally confined. More important still is a modification of the rating system which requires analysts to indicate the *amount of each characteristic demanded of the worker* in order to do the job satisfactorily, the amount required being defined as follows:

(A) A very great amount of the trait, such as would be possessed by not more than 2 per cent of the general population.

(B) A distinctly above-average amount of the trait, such as would be possessed by the highest 30 per cent of the general population, but less than the amount designated by A.

(C) An amount of the trait less than that possessed by the highest 30 per cent of the general population.

The statement of qualifications in terms of *amount*, rather than in terms of *importance* on the job, has many advantages. In an adaptation of the psychographic method developed by the author for the U. S. Navy during World War II, ratings on importance of a trait for a job and on the amount required were combined to supply complete information useful in the differential classification of Navy personnel to billets aboard warships.⁷ This combination makes it possible to give prime consideration to factors which are critical for adequate performance while considering also the minimum requirements which must be met in terms of intelligence, mechanical aptitude, and similar traits needed for adequate performance.

Advances in Grouping Occupations into "Families."—In addition to gathering data on several thousand occupations, the United States Employment Service has made use of these results in setting up families of occupations—each family having common denominators in terms of nature of work done; materials used; and tools, machines and work-aids used; with attention given to worker characteristics as well. One such "family," for example, consists of 20 occupations, in 4 industries, which are alike in requiring *strength, dexterity, and coordination* in "B" amounts and in that *none has a formal education requirement*.⁸ Preliminary groupings of this kind reveal marked possibilities for setting up more comprehensive families to be used not alone for placement and guidance, but for curriculum planning in

schools, so that training can be given for families of similar occupations, thus enlarging the future chances for the employment of the student. Job families have also played a part in aiding the vocational adjustment of the physically handicapped, and in identifying civilian jobs in which military training and experience acquired by World War II veterans could be utilized.⁹

The Test Method in Occupational Analysis.—Job psychographic methods involve primarily a subjective analysis and rating of the requirements of a job. Such procedures are used largely because the determination of worker characteristics and job similarities by more objective methods is a slow and expensive program. A more objective approach is found in the procedure of describing job qualifications in terms of the psychological tests used in forecasting occupational proficiency. When this method, early advocated by Link, is properly employed, requirements for the job are actually stated in terms of critical scores on tests which have been experimentally validated as “predictors” of proficiency on the job. This is essentially what happens when tests to be used in selecting workers for specific occupations are prepared, since the passing score on the test battery becomes, in practice, the stated qualification for employment.

Classification of Occupations by General Intelligence Levels.—An example of the test approach in describing job requirements is found in the classification of occupations in terms of general intelligence levels. A portion of such a classification, prepared by Fryer and Sparling, is presented in Table I.¹⁰ The basic data for this classification are taken, in the main, from distributions including 18,000 men in 114 occupational groups collected in the U. S. Army during World War I when various intelligence tests, including the historically famous Alpha, were given to nearly two million civilian draftees drawn from a large variety of occupations. Data from later studies of records of civilian workers were also employed. Following a common practice in this type of analysis, the range of the middle 50 per cent of mental ages of each occupational group is

TABLE I.—CLASSIFICATION OF OCCUPATIONS BY
INTELLIGENCE LEVELS *

Corresponding Intelligence—Achievement Values

ACHIEVEMENT LEVELS	Intelligence Groups	<p>C</p> <p>Average</p> <p>13.0 to 14.9</p> <p>Mental Age</p> <p>(Estimated Average Mental Age: 13.75)</p>			
	GENERAL	<p>Intelligence for routine and skilled mechanical work</p> <p>Rarely capable of complicated abstract detailed work</p> <p><i>Skilled occupational level</i></p>			
	EDUCATIONAL	<p>Ability for elementary school graduation and some secondary school training</p>			
	OCCUPATIONAL (EXPECTED SUCCESS AS)	<p>Engineman (Locomotive)</p> <p>Farrier</p> <p>Telephone operator</p> <p>Stock checker</p> <p>Handyman (General mechanic)</p> <p>Policeman</p> <p>Auto assembler</p> <p>Engineman (Marine)</p> <p>Riveter (Hand)</p> <p>Tool and die maker</p> <p>Auto engine mechanic</p> <p>Laundryman</p> <p>Gunsmith</p> <p>Plumber</p> <p>Pipefitter</p>	<p>Lathe hand (Production)</p> <p>Auto mechanic (General)</p> <p>Auto chauffeur</p> <p>Tailor</p> <p>Dressmaker</p> <p>Milliner</p> <p>Lineman</p> <p>Machinist (General)</p> <p>Motorcyclist</p> <p>Brakeman (R.R.)</p> <p>Actor (Vaudeville)</p> <p>Butcher</p> <p>Fireman (Locomotive)</p> <p>Blacksmith (General)</p>	<p>Shop mechanic (Railroad)</p> <p>Printer</p> <p>Carpenter (General)</p> <p>Motorman (Street car)</p> <p>Conductor (Street car)</p> <p>Baker</p> <p>Cook</p> <p>Mine drill runner</p> <p>Painter</p> <p>Concrete worker</p> <p>Farmer</p> <p>Auto truck chauffeur</p> <p>Bricklayer</p> <p>Caterer</p>	<p>Horse trainer</p> <p>Cobbler</p> <p>Engineman (Stationary)</p> <p>Barber</p> <p>Hairdresser</p> <p>Sales clerk</p> <p>Horse hostler</p> <p>Horse shoer</p> <p>Storekeeper (Factory)</p> <p>Aeroplane worker</p> <p>Boilermaker (General)</p> <p>Rigger</p> <p>Teamster</p> <p>Miner (General)</p> <p>Waiter</p> <p>Station agent (General)</p>

* From Fryer and Sparling.

used to establish desirable limits of general intelligence for the occupation.

Data gathered during World War II, by the Personnel Research Section, Adjutant's General's Office of the War Department, including Army General Classification Tests (AGCT) scores of 81,553 white enlisted men in 227 different occupations, have been analyzed in a somewhat similar manner to show the relationship between test scores and civilian occupations.¹¹ Results of this test were reported in terms of standard scores which had a mean of 100 and a standard deviation of 20 for the standardized population. While the term "intelligence test" has never been officially applied to the Army General Classification Test, it has nevertheless been found to correlate almost as high with various tests so designated as their own reliability coefficients. In Table II are shown the median, 25th, and 75th percentile scores for a number of occupations, including a sampling of those listed in Table I, to illustrate the finding from the analysis of World War II data.

Such classifications of occupational requirements in terms of intelligence test scores represent a step in the direction of objective analysis and description of occupational requirements, since these are stated not in terms of traits, but in units of test scores, and the statement is based upon an experimental study of observed distributions of measures among those actually working in the occupations considered.

"Family" Groupings by Intelligence.—An important feature of the classification of occupations by general intelligence levels is that it groups occupations into "families" which have a common denominator in terms of the required level of intelligence. Such a classification shows that most people, so far as general intelligence is concerned, are capable of successful achievement in a wide range of occupations. This is apparent in Table I which shows, for example, that even within the narrow range of mental ages 13 to 14.9 are found 50 per cent of workers in occupations so diverse as auto assembler, streetcar conductor, tailor, milliner, salesclerk, hairdresser, horseshoer, bricklayer, and so on.

TABLE II.—CLASSIFICATION OF OCCUPATIONS BY AGCT SCORES*

<i>Occupation</i>	<i>N</i>	<i>25th Percentile</i>	<i>Median</i>	<i>75th Percentile</i>
Accountant	216	121	129	136
Teacher	360	117	124	132
Lawyer	164	118	124	132
Chief Clerk	297	114	122	131
Stenographer	206	115	122	130
Draftsman, Mechanical	99	111	120	128
Reporter	79	113	120	128
Clerk, Typist	616	119	119	126
Cashier	168	107	117	127
Clerk, General	2063	108	117	125
Boilermaker, Layout—Obs.	88	99	116	125
Installer, Repairman—Tel. & Tel.	62	108	115	120
File Clerk	119	105	114	123
Airplane & Engine Mechanic	113	102	114	123
Carpenter, Heavy Construction	82	97	112	124
Shipping Clerk	408	101	111	121
Machinist	617	99	110	120
Policeman	172	96	109	118
Lineman, Tel. & Tel.	96	97	109	120
Locomotive Fireman	106	97	108	118
Sheet Metal Worker	462	95	107	117
Brakeman, Railway	182	93	105	116
Boilermaker	158	94	105	115
Automotive Mechanic	1693	89	102	114
Blacksmith	162	88	102	113
Bricklayer	213	88	102	114
Chauffeur	358	87	100	113
Painter, General	680	83	99	113
Horsebreaker	91	85	97	108
Tailor	74	82	97	112
Gas and Oil Man—Obs.	61	85	95	111
Laborer	7805	76	93	108
Barber	166	79	93	109
Section Hand, Railway	337	74	90	104
Teamster	284	74	87	104
Miner	502	75	87	103
Farm Worker	7475	70	86	103
Lumberjack	236	70	85	100

* Adapted from Stewart.

Limitations of Occupational Classifications by Intelligence Level.
 —Although such a classification into families is important, its practical significance is limited by the wide range of general intelligence characterizing almost every occupational group. For example, although 50 per cent of the workers listed in Table I have mental ages of 13 to 14.9, an additional 25 per cent have mental ages ranging from 15.0 to the very top of the mental-age scale, and 25 per cent have

mental ages below 13, ranging in some instances to close to the bottom of the scale. Moreover, there is much overlapping from level to level, so that one finds some unskilled workers exhibiting the same degree of general intelligence as some of the less alert in professional ranks, and many semiskilled and skilled workers possessing general intelligence equal to that of the most alert professional man.

Such facts clearly limit the significance of general intelligence, as expressed in mental age, for vocational guidance and selection. Moreover, there are relatively few instances of close relation between amount of general intelligence and degree of proficiency or success in particular jobs. For example, the range of mental ages of the middle 50 per cent of speckers in the textile industry was found by the author to be from 10.3 to 14 years. There was no tendency for those in the upper end of the range to work faster or to turn out a better product than those in the middle or at the lower end of the total range. In other words, the percentage of good speckers among girls with mental ages above 14 years and among those with mental ages below 10.3 years was as high as the proportion within the middle 50 per cent.

Similar facts have been uncovered in the study of many other occupations, such as streetcar motormen, composers, inspectors, assemblers, and others, particularly at the semiskilled level. As a matter of fact, it is only rarely that a close relation is found between degree of job success and general intelligence level over the entire range of the scale, although occasionally, as in clerical work, where rate of promotion has been shown to depend somewhat upon mental age, and in "higher grade" jobs, there does appear a relation between amounts of general intelligence and degrees of job proficiency.

Minimum Mental-Age Requirements.—While, in general, little significance can be attached to the entire range of mental ages, minimum requirements in the way of general intelligence are frequently significant in determining qualification for work. This is particularly true at the professional and semiprofessional levels and, to some extent, in major executive and sales-managerial jobs, partly because, as has been particularly demonstrated in the analysis of World War II data, there is restricted variability primarily owing to the absence

of low scores at these levels. Minimum critical mental-age levels have also been established for advanced types of clerical and secretarial work, and, to some extent, for highly skilled trades. However, to be useful, minimum critical general intelligence test scores or mental ages must be experimentally established for each occupation and for individual plants by a direct comparison between performance on the job and general intelligence test scores.

Minimum standards of general intelligence are also useful in the guidance and placement of subnormals. For productive work in industry, even of the unskilled type, a minimum age of 5 to 6 is apparently needed. Burr, of the Vocational Adjustment Bureau of New York City, has shown that for packing small articles, such as powderpuffs, a minimum mental age of 7 or 8 is required; for crude hand sewing, packing difficult articles, etc., a minimum mental age of 9 or 10; for stock-keeping, winding cotton and wool braid, a minimum mental age of 10 or 11, and so on.¹²

Maximum Intelligence Levels May Be Significant.—Studies also show that for certain jobs maximum mental-age levels may be significant. Among department-store cashiers, for example, the author has found excessive turnover among employees with higher mental ages. There is evidence that excessive feelings of monotony, dissatisfaction with occupational prestige, social position and progress, lack of interest and motivation, and waste of abilities may follow from the placement of a highly intelligent individual into a repetitive or "low grade" job.

In Summary.—In general, it may be said that general intelligence level is a particularly significant item in the statement of occupational qualifications at the professional and semiprofessional level. It also has significance at the level of the skilled trade and in directing workers toward clerical occupations. The importance of the general intelligence specification rapidly diminishes as occupations approach the semiskilled levels and practically disappears, except for a lower minimum, at the level of unskilled work. Moreover, at all levels, the statement of requirement in terms of general intelligence must be supplemented by a detailed analysis and description of the special

aptitudes, temperamental and other characteristics which, along with and generally to a greater extent than general intelligence, determine occupational success or failure.

Occupational Ability Patterns.—The test technique for stating the mental requirements has been employed by Trabue in the development of occupational ability patterns. Such a pattern presents graphically the average scores made on a selected group of tests by a relatively homogeneous group of workers employed in an occupation, in comparison with the distribution for a random population. The tests used for this purpose by Trabue include a measure of educational achievement, the Minnesota Clerical Test—Numbers, the Minnesota Clerical Test—Names, the Tweezer Dexterity Test, the Minnesota Manual Dexterity Test, Strength of Right Hand, Strength of Left Hand, Bernreuter Personality Inventory.

The occupational ability pattern or profile presumably gives a picture of the range and pattern of measured aptitude and personality traits which distinguish each job. The assumption is that for purposes of vocational guidance and selection the *individual profile* obtained by giving the same tests can be compared with the occupational ability pattern in determining suitability for the job. It is also assumed that by observation, patterns can be matched to arrive at families of occupations which are alike in terms of fundamental requirements.

In fact, the method is far less objective and exact than it appears to be on the surface. Subjective judgment is involved in making the comparison of an individual's profile of scores with the occupational ability patterns. In practice, there has been a tendency to overemphasize the correspondence between the shape of the individual profile and an occupational ability pattern. This is a particularly serious danger because, while only the average score of each occupational group is shown in the profile, the scores are actually widely distributed. Moreover, although the significance of individual tests undoubtedly varies from job to job, no data on such differences are given. This means that the assignment of relative weights becomes a matter of judgment.¹³

In general, in spite of the use of test scores as a basis for the graphic presentation of occupational requirements, the occupational ability pattern essentially possesses the same disadvantage of subjectivity as do the job psychographic methods described above. In addition, it is more susceptible to abuse, oversimplification, and misinterpretation by untrained and uncritical observers. At the same time it is considerably more cumbersome, time-consuming, and costly than the job psychographic methods.

Factor Analysis in the Study of Occupational Qualifications.

—Factor analysis of test results has been used as a step in identifying fundamental aptitudes underlying proficiency in a variety of occupations.¹⁴ From an analysis of aptitude tests used by the Army Air Forces, Guilford has concluded that the chief hope in solving the problem of fitting individuals to vocational (and educational) plans appears to lie in the direction of the use of factorial practice and thinking, since persons, tests, and jobs can all be described in terms of the same reference frame—one with which many can agree because it is derived in an operational manner.¹⁵ The demonstration that a few relatively independent factors account for differences in job requirements makes it possible not alone to group occupations of similar requirements, but also to make predictions of individual success or failure for a large number of occupations through the use of a battery including a relatively small number of tests.

Studies by the Occupational Analysis and Industrial Services Division, United States Employment Service¹⁶ have resulted in the isolation of 10 aptitudes designated as: *G*—intelligence; *V*—verbal ability; *S*—spatial ability; *Q*—clerical perception; *A*—aiming, etc., which in varying degrees and combinations contribute to success in various occupations. The outcome of such research has been the development of the General Aptitude Test battery, referred to on page 508, consisting of 15 tests, requiring $2\frac{1}{4}$ hours for administration, which has been tentatively standardized to obtain information about an individual's aptitude for 20 fields of work representing about 2000 occupations.¹⁷ Scores made by an individual tested on this battery are incorporated into an Individual Aptitude Profile which is compared with the 20 Occupational Aptitude Patterns.

While visual comparison is involved, this procedure avoids some of the basic errors on principles and also many of the difficulties that have been recognized in the use of occupational ability patterns of the graphic type. In particular, the critical scores provided for the USES Battery obviate the difficulty experienced by counselors and others in estimating the similarity of an individual's graphic profile of test scores to each of a large number of occupational patterns representing merely the average standard scores of occupational groups.

Hull's Proposal for a Universal Aptitude Battery.—Studies of the type described immediately above represent progress toward a program formulated by Hull approximately twenty years ago which calls for the construction of a single universal battery of 30 or 40 tests which will sample all important occupational traits.¹⁸ As the outcome of suitable experimental investigations there would then be developed 40 or 50 different equations, each weighting the tests in the battery in a different way so as to make the best possible prediction of success in each of 40 or 50 occupational fields, without the necessity of identifying the underlying aptitudes by name. Occupational qualifications would then be stated without reference to arbitrarily designated traits in terms of mathematical formulae very much like those used in designating chemical combinations, the elements being the tests used in measuring the occupationally significant traits.

This program for using tests simultaneously for job analysis and vocational prediction perhaps represents the ideal toward which the psychologist should strive in matching men and occupations. However, at the present time, there are still too few situations in which differential scores for a variety of jobs have been developed on the basis of a thoroughgoing validation of the test battery for each job. For the time being, systematic analyses by other methods described in this chapter remain as probably the most useful psychological procedures in occupational analysis.

In Summary.—Considerable progress has been made in the formulation of occupational requirements in exact terms. However, much remains to be done, particularly in analyzing jobs from the

viewpoint of temperamental requirements and social relations and in supplementing the "atomistic" approach with an emphasis upon the "total job pattern."¹⁹ In spite of these deficiencies, psychological techniques for analyzing occupational requirements at least represent an important advance beyond the vague, ill-defined procedures of the so-called practical vocational counselor and industrial personnel worker.

Job Evaluation.—Job analysis supplies information useful for many purposes other than the selection of personnel, including (1) the improvement of work methods, (2) increasing safety at work, (3) the development of training programs, (4) establishing work schedules, etc. In recent years particular attention has been centered upon the use of job analysis methods as a basis for classifying and pricing jobs in the industrial plant. Such an application of job analysis methods is usually referred to as *job evaluation*.²⁰

There is a multiplicity of job evaluation plans, but most call for the assignment of grades or points to indicate the job content and requirements in terms of such factors as education, experience, training time, physical demands, mental demands, job hazards, working conditions, responsibility, etc. Psychological techniques can be employed to advantage in improving job evaluation.²¹ For example, the number of factors considered necessary for the complete appraisal of the job varies from 3 to 50 depending upon the job evaluation plan, and the tendency is to favor many rather than few factors. However, as has been shown in a recent comparison of two rating plans, simplification of job evaluation can be achieved by reducing the number of factors without any loss in the reliability of estimates.²² Evidence from this and other investigations shows that ratings on certain types of items, such as "skill," have greater reliability than ratings on other items, such as "work hazards," and points to the need for greater care in the selection and definition of items for use in job evaluation.

There are also many discrepancies among job evaluation systems with respect to the total number of points assigned to each factor and the ratio between the maximum and minimum scores on the rating scale. In some instances, the maximum is 4 or 5 times as high

as the minimum; in other instances it is as much as 15 or 20 times as high. Evidence from studies which show that the most competent individual in any vocation will seldom be more than 3 or 4 times as capable as the poorest can be usefully applied in formulating more satisfactory and more reliable scoring systems for job evaluation.

In general, while some research has been carried on in this important area of job analysis, there is still need for much more experimentation with a view of providing a sounder basis for job evaluation which, because of its use in setting wage rates, is of particular significance to both employers and employees.

ANALYSIS OF THE INDIVIDUAL EVALUATION OF TRADITIONAL TECHNIQUES

Progress in vocational guidance and vocational selection also calls for a supply of adequate techniques for analyzing the individual. This involves: (1) An evaluation of techniques commonly used in guidance and selection, and (2) the development of improved tools and procedures to supplement or supplant those which are found to be inadequate or unsatisfactory.

Experimental Studies of the Application Blank and Personal History Forms.—An excellent illustration of the psychological approach in evaluating techniques commonly used in matching men and occupations is to be found in experimental studies of the application blank. In employment practice, an over-all judgment of the fitness of the applicant is made from the examination of this blank, without any attempt to determine the differential significance of individual items. Psychological studies show that some items may be absolutely worthless in determining fitness for work, whereas others may be highly valuable in predicting performance on the job. For example, an investigation by the author, in 1926, revealed that 7 application-blank items—age, nationality, marital status, number of children, number of dependents, weight, and previous occupation—were of significance in predicting the sales performance of taxicab drivers, employed by the Yellow Cab Company of Philadelphia,

operating on a commission basis. No other items on the application blank were of any value for this purpose. The study showed that by weighting and combining scores on these items it was possible to eliminate 60 per cent of the poorest earners, that is, those falling in the lowest 25 per cent in terms of sales performance, while rejecting from employment only 22 per cent of the best and only 18 per cent of the average earners.

In this study the author made use of a method for weighting application blank items originally developed by Russell and Cope²³ for use by the Phoenix Mutual Life Insurance Company in analyzing personal history items. Research carried on by this company for many years, in part with the assistance of the Life Insurance Sales Research Bureau, has consistently shown that sales performance can be improved by using an application score obtained by weighting selected items in the employment of life insurance salesmen. In 1919, 56 out of every 100 salesmen employed failed to last out the first year. In 1921-22, after the application score had been put into use, only 42 out of every 100 salesmen failed to remain one year. Between 1922 and 1925, this figure had been further reduced to 30 out of every 100. Moreover, whereas in 1912 the Phoenix Mutual Life Insurance Company employed 1700 salesmen to sell insurance to the value of \$20,500,000, in 1923, under the new plan, 375 salesmen had sold insurance to the value of \$52,000,000. Although a careful interpretation of those results requires a consideration of growth in insurance sales throughout the country during the intervening years, and of other factors, the data nevertheless illustrate the manner in which the validation of predictors of success in selling life insurance has been approached. The same company has in more recent years reviewed the experience of all salesmen who were under contract in regular agencies from 1927 to 1935 and has developed an improved revision of the original scoring methods applying to various age levels.²⁴

Later studies by the Life Insurance Sales Research Bureau, involving a group of companies, have further demonstrated the value of experimentally validated personal history items in the selection of life insurance salesmen. Through an analysis of data on 10,111 men contracted as full-time agents during 1933, 1934, and 1935, by

11 companies, a scoring system for 10 items* was found to give good prediction on two alien populations of 743 and 878 life insurance salesmen in terms of:

- (1) *whether or not the agent would remain under contract for 12 months;*
- (2) *whether or not the agent would remain under contract for 24 months;*
- (3) *paid-for production during the first 12 months* (for agents who remained in the business that long);
- (4) *paid-for production during the first 24 months* (for agents who remained in the business that long).²⁵

Further experimentation with this personal history Rating Chart has led to its extended use as part of a newer instrument for the selection of salesmen, known as the "Aptitude Index for Life Insurance Salesmen" described on page 544.²⁶

The usefulness of biographical items, such as are found on an ordinary application blank or a special personal history form, is not confined to the selection of salesmen. Bridgman has shown that scholarship ratings, achievement, and age of graduation are much more significant than other items in predicting the success of college graduates in the Bell Telephone System.²⁷ From a study by Uhrbrock and Richardson²⁸ it appears that in the plants of the Proctor and Gamble Company the satisfactory supervisors are men with 9 or more years of schooling, between 25 and 39 years of age, with military service, who are confident of their ability to read blueprints. Evidence available from research during World War II leading, for example, to the use of biographical items in the selection of naval aviation cadets²⁹ points to the advantage of further extended research on weighted application scores which can often transform a procedure that ordinarily has little merit into one which really helps in hiring qualified workers.

The Value of Photographs in Estimating Fitness for

* Items found to be significant for prediction included number of dependents, occupation, present employment status, time with present employer, present membership in organizations, officer in how many organizations, net worth, minimum current living expenses, amount of life insurance owned, and length of negotiations.

Work.—The photograph of an applicant is frequently used in gauging “intelligence,” “trustworthiness,” “character,” “sociability,” “aggressiveness,” and other qualifications. Experimental studies by Anderson, McCabe, Husband,³⁰ and others show clearly that photographs give neither reliable nor valid clues to vocationally significant aptitudes and temperamental characteristics.

In most such experiments observers without experience in employment or counseling are used. Viteles and Smith³¹ presented to 24 members of a metropolitan personnel association, including mainly employment managers and vocational counselors, 2 photographs of 5 *successful* and 5 *unsuccessful* men in each of the fields of law, medicine, education, and engineering. One photograph of each man was taken at the time of graduation from college (younger group); the second 25 years later (older group). Ratings on vocational success were made by Landis and Phelps, who supplied the material for the experiment, from biographies appearing in a yearbook published on the 25th anniversary of the graduation of 850 men from a large Eastern university.

Each observer, without being told that the photographs were of the same men, was asked to indicate, for the “older” group, whether it was the picture of a “successful” or “unsuccessful” man and the occupation in which he was employed. In the case of the younger group, judgment was in the form of prediction as to whether he would be “successful” or “unsuccessful,” and guidance as to which of each of the four occupations he should enter. In addition, each observer was asked to estimate the per cent certainty of his judgment and the basis of judgment, for example, shape of face, height of forehead, position of eyes, etc.

Results were compared with those obtained by Landis and Phelps using college students as observers. Personnel workers made correct judgments in 52.8 per cent of the cases, whereas college students were correct in 51.3 per cent of the cases. Both would have done just as well by tossing coins and recording, without looking at the photographs, a success judgment for every head and a failure judgment for every tail. With respect to certainty of judgment, the average “per cent of certainty” for personnel workers was 55 and for college

students 34.8, in spite of the fact that the accuracy of judgment in both cases was no better than chance. In matching photographs and careers, there was likewise not even an approximation of accuracy. "General impression" and "facial expression" were reported by the personnel men as their basis for judgment in over 50 per cent of the cases.

It is apparent from such experiments that no dependence can be placed on the photograph as a tool for estimating fitness for work. The functions of the photograph must be limited to gathering preliminary impressions on appearance and to the identification of applicants and employees.

"Character-Analysis" Systems.—The continued use of photographs in judging the qualifications of applicants reflects in part the faith placed in formal systems of character analysis. Shape of head and face; color of hair, eyes and skin; texture of hair and skin; skull dimensions; formation of teeth are among the physical signs which, according to the exponents of such systems, are dependable in diagnosing occupationally significant traits.

None of these character-analysis systems has withstood the test of experimental investigation. Characteristic of such studies is that of Cleeton and Knight³² who, using calipers, tapes, head squares and other especially designed instruments, with 28 college students as subjects, made careful measurements of physical characteristics claimed to be diagnostic of "judgment," "intellectual capacity," "frankness," and 5 other traits. These were correlated with ratings on the traits made independently by close associates and by 70 observers experienced in handling men who had no previous acquaintance with the subjects. The highest correlation proved to be .32, or approximately 5 per cent better than chance, and almost half of the correlations were negative. No agreement was found among different physical factors described by character analysis as diagnostic of the same traits. The average correlation of 201 pairs of factors proved to be zero.

Other investigators, using both these and other evaluation methods, have likewise failed to confirm the claims of the character

analysts.³³ Even when the latter cooperate, as did the exponents of "Vitosophy" in an experiment by Ford,³⁴ the correlations obtained between trait measurements and character-analysis readings turn out to be like those obtained by random drawings from a lottery box.

Graphological Systems of Character Analysis.—A number of character-analysis systems depend upon psychophysiological rather than upon physiognomic or other physical signs. Chief among these are graphological systems which make handwriting the basis of judgment. Starting with an early investigation by Binet, there has been a series of studies designed to test the validity of such systems. Typical is an experiment by Brown, who, applying procedures earlier employed by Hull and Montgomery, asked 30 subjects to copy a piece of prose under identical conditions.³⁵ The samples of handwriting were then submitted to microscopic examination and the measurements correlated with ratings on personality traits provided on one another by the subjects whose long mutual association gave each a fairly reliable knowledge of the character of the others. Susceptibility to objective measurement of the handwriting signs and agreement among graphologists with respect to their significance were the criteria employed in selecting the traits to be studied. The results, given in Table III, show consistently low correlations between handwriting signs and their supposedly associated personality traits. In some cases the direction of the correlation is actually opposite to that claimed by the graphologists.

Such studies have been criticized by professional graphologists who claim that accurate graphological diagnosis calls for a consideration of the general features of script and their interrelation or "global pattern" rather than the microscopic study of detailed elements or signs. Moreover, from the laboratories of such graphologists come findings which, at least on the surface, appear to be highly favorable to graphology. Saudek³⁶ examined 73 specimens of handwriting submitted by 18 business firms and interpreted 19 of them as belonging to dishonest people and 54 to honest individuals. The firms confirmed the accuracy of his diagnosis in 14 out of 19 cases of dishonesty. In no case was an honest person diagnosed as dishonest.

Kügelgen, Seesemann, Klages, and others have reported similarly favorable results.

TABLE III.—SHOWING COEFFICIENTS OF CORRELATION BETWEEN TRAITS OF HANDWRITING AND VARIOUS TRAITS OF PERSONALITY (Computations based on data of Lois E. Brown)*

<i>Personality Trait</i>	<i>Handwriting Trait</i>	<i>Correlation Coefficient (r)</i>
Bashfulness	Width of down strokes	.11
Ambition	Tendency to upward slope as line crosses page	.23
Persistence	Width of down strokes	-.05
Persistence	Disconnected writing—per cent of breaks of line within words	-.03
Personal neatness ...	Neatness in appearance of writing	.23
Personal individuality	Individuality in appearance of writing	.15

* From C. L. Hull, *Aptitude Testing*. Yonkers-on-the-Hudson: World Book Company, 1928, 150.

Powers,³⁷ of Dartmouth College, has applied the global approach in an experiment in which personality sketches of 10 subjects were matched with their handwriting samples by 123 male undergraduates, 25 faculty members, and 17 professional graphologists. On the basis of chance the number of correct matchings should be 1 out of 10. The average number of correct matchings was 1.77 for the student group, 1.80 for the faculty group, and 2.41 for the graphologists. It is evident that handwritings evidently indicate even to untrained judges definite personality traits. Graphologists, on the other hand, give better judgments and make more correct matchings than do untrained persons.

More recently, Super has compared the diagnoses of a graphologist with the results of psychological tests.³⁸ Each of 24 students sent a sample of his handwriting, with a request for help in the choice of a vocation, to a graphologist advertising in various well-known eastern and midwestern newspapers who in her advertisement referred to the work of Saudek and other European graphologists and stated that many European and some American industrial firms used the services of graphologists in personnel selection and promotion. The vocational recommendations and the diagnoses of personality

were then compared with test results, including scores on the American Council of Education Psychological Tests, the Strong Vocational Interest Test, and the Berneuter Personality Inventory.

Applying the Fryer and Sparling tables referred to on page 514 in rating the appropriateness of the recommendation in terms of the student's intelligence level, it was found that the occupations recommended by the graphologist showed no more than a chance relationship with the recommendations which a psychologist would have made on the basis of intelligence tests. The occupations recommended by the graphologist were quite different from those which a psychologist would have recommended on the basis of an interest inventory, certain unsuitable occupations being recommended with more than chance frequency by the graphologist. Likewise, the graphologist's estimates of the students' personality traits showed no more than a chance agreement with those made by a psychologist on the basis of personality inventories in the case of four traits, and in the case of the two others were worse than chance, again revealing a constant error.

In certain European countries, most particularly in Germany, graphology has in recent years been increasingly accepted by business and industrial firms as one basis for the selection and promotion of employees. A survey by Long and Tiffin³⁹ of 12 companies in the United States which had been suggested as possible advocates of graphological analysis generally showed considerable confidence in the usefulness of graphology. These investigators suggest that psychologists have been lax in making clear to an over-credulous public the fact that scientific studies do not justify the faith in the sampling of responses reported by them.

Among psychologists themselves there appear differences of opinions on the possibilities of handwriting as a diagnostic tool. At one extreme is the position of Symonds, of Columbia University, who includes graphology among systems supported by charlatans and urges that there be no acceptance of claims made by graphologists. At the other extreme are Roback, who finds graphology one of the most promising of "psychodiagnostic" systems, and Allport and Vernon, who feel that "on a *priori* grounds handwriting, which may be considered as "crystallized gesture," should be expected to furnish

a valuable though intricate index to the patterns of personality.⁴⁰ However, regardless of what future promise there may be in handwriting as a clue to personality, *in terms of everyday practice in vocational selection and guidance, there is still no justification for the use of handwriting in predicting fitness for work*, particularly since the degree of accuracy in prediction in even experiments favorable to graphology is far below the level reached by most psychological tests.

Evaluation of the Interview.—Among traditional methods of vocational selection and guidance the interview probably represents the one that is most consistently employed and is given the greatest weight. Experimental studies have led to the conclusion that the interview, *as ordinarily conducted*, fails to furnish valid and reliable information as to aptitudes, temperamental characteristics, attitudes, and other traits of the individual. In an early study by Scott, Bingham and Whipple, 20 salesmanagers and 3 investigators of problems in selecting salesmen interviewed 24 applicants for sales positions and rated them in order of suitability as salesmen. In practically every case range of opinion covered almost the entire order-of-merit scale. Most applicants were rated as belonging in the best half of the group as frequently as they were placed in the worst half of the group. A later study of the same type by Hollingworth⁴¹ produced similar evidence of disagreement among interviewers.

In an experiment by Scott, estimates on the sales ability of 12 applicants were made by 13 salesmanagers and later compared with the actual sales records.⁴² Results showed considerable disagreement among interviewers. In addition, most of the estimates showed no relation to actual sales performance. Even when the estimates of all 13 were pooled, the prediction of sales performance was less than 25 per cent better than chance. However, results suggested that a few of the interviewers made more valid judgments than did others and that the opinions of certain interviewers agree better with the pooled judgment of the group than do those of others.

Improving the Interview.—The failure to define terms; varying conditions in the interview; individual differences in the capacity

and training of interviewers constitute major sources of error in the interview. The influence of these and other sources of error can be reduced by appropriate modification of interviewing techniques and conditions. For example, in an English study⁴³ it was found that (1) by selecting and carefully defining the traits to be observed in an interview, and (2) by providing a standard method for the expression of judgment in the form of a rating scale, it is possible to arrive at an estimate of certain traits—particularly temperament and character—which, in terms of reliability and validity, approach the results of psychological tests now commonly used for measuring such traits. Hovland and Wonderlic, in a study involving the selection of outside representatives for the Household Finance Corporation, report a reliability of .71 for interviews conducted by 2 different interviewers using standardized procedures centering around a blank covering work history, family status, social history, and personal history.⁴⁴ From a comparison of independent interview ratings made by a psychologist and a psychiatrist of 399 candidates for reserve commissions and 137 SPAR officer candidates, which showed reliability coefficients ranging from .80 to .88, the conclusion is also drawn that with well-trained interviewers, working under carefully defined conditions, quantitative interview ratings representing a complex over-all evaluation can be made as reliable as most personality tests, and more reliable than many of them.⁴⁵ However, these findings are contaminated by the fact that both interviewers had available results on aptitude and personality tests given to candidates in advance of the interview.

O'Rourke,⁴⁶ of the U. S. Civil Service Commission, has found that while there is considerable disagreement among untrained interviewers, the use of a standard interview and training in interviewing techniques results in a marked increase in the uniformity of ratings. In an extensive program sponsored by the Employment Board, Department of Public Assistance, Commonwealth of Pennsylvania, numerous examining boards, including a total of about 800 examiners, were trained in the use of a rating scale for recording estimates on personality traits made during oral examinations given in establishing eligibility lists for about 5000 vacancies. According to Bingham, interview ratings provided reliable estimates since, in sample studies, among ratings given by several members of the inter-

viewing board there is seldom "a rating on any trait which diverges more than one-fifth of the scale length from the average of the rating on that trait given to that candidate by the other examiners," and "the average deviation from the consensus is about one-ninth of the scale."⁴⁷ Unfortunately, although these ratings may be reliable, a later investigation, supervised by the author, shows that they had no practical significance in selection since (1) only approximately 10 per cent of the candidates were eliminated from further consideration on the basis of the oral interview ratings, and (2) in a sample of 251 Junior Visitors in 18 counties, there were no diagnostic differences in oral interview scores among those considered, appointed, and not appointed.

Evidence that the interview can be valid is found in a survey conducted at the Aircraft Warning Training Center at Drew Field, Florida. The Assigning division at this center ignored in many cases the classification interviewer's recommendation in sending men to schools. This provided an opportunity for comparing the progress in training for a military task of those assigned on the basis of an interview conducted by men who were given extensive and continuous training in interviewing, with the achievement of those who were shifted by the Assignment division without an interview.⁴⁸

The school results of these two groups are shown in Table IV. It will be noted that of those assigned by the interviewing section, 84 per cent graduated in the prescribed time, whereas only 29 per cent of the randomly assigned men finished successfully. In addition, the grades of those graduating were higher among those selected by the interviewing process.*

According to a report from the Psychological Corporation, 291 men were employed by an aircraft engine factory during the third quarter of 1942 through the use of ordinary selection procedures, including interviewing and occasional tests. Of those hired, 22.3 per cent were separated from employment for reasons other than induction within three months after the date of employment. During the following three months a standardized interview procedure developed by Fear and Jordan⁴⁹ was used in selecting 169 men for the same plant without any other changes in employment procedure. Of

* The significance of these findings with respect to the validity of the interview is lessened by the fact that interviewers had access to test scores. However, it is claimed that "the interview continued to be the basis for the assignments, it being our experience that this was the most valid method of selection."

the latter, 15.3 per cent were separated during the ensuing three months. This reduction is ascribed by the investigators to the standardized interview procedure.

TABLE IV.—SCHOOL RESULTS OF 226 MEN ASSIGNED TO 588TH SIGNAL A. W. BN., AWUTC, DREW FIELD, FLORIDA, FOR FOUR CONSECUTIVE CYCLES BEGINNING AUGUST 30, 1943
Source: School Records

<i>School Result</i>	<i>Number of Men Placed by Interview</i>	<i>Number of Random Placed Men</i>	<i>% of Men Placed by Interview</i>	<i>% of Random Placed Men</i>
Dropped for inaptitude	0	11	0	22
Dropped for physical disability	10	18	6	35
Transferred to subsequent cycle for failing grades	18	7	10	14
(Total dropped)	(28)	(36)	(15)	(71)
Graduated—Satisfactory	25	8	14	16
Graduated—Very satisfactory	54	4	31	8
Graduated—Excellent	61	3	35	6
Graduated—Superior	7	0	4	0
(Total graduated)	(147)	(15)	(84)	(29)
Total	175	51	100	100

A question which frequently arises in the discussion of selection methods is that of the relative cost of the various techniques which can be used for this purpose. Of interest in this connection is an experiment conducted by the National Research Council Committee on Selection and Training of Aircraft Pilots.*⁵⁰ In this, a Board, consisting of three interviewers, conducted a relatively standardized interview involving the use of rating scales referring to specific areas of questioning, such as *academic background as related to flying; desire to fly; hobbies, diversions, and outside activities as related to flying; etc.*

The reliability of the average of the three interviewers' summary ratings on "fitness for flight training" proved to be .81 as determined by the Spearman-Brown formula. An analysis of results obtained at three centers, involving from 105 to 168 student pilots,

* Now known as the Committee on Aviation Psychology.

showed that interviewers reached levels of prediction on some aspects of student pilots' future flight performance which are accepted as having practical significance, especially in predicting success in later phases of the Civilian Pilot Training flight instructors course.

The interview, in this situation, met the routine tests of acceptability for selection and classification purposes. However, other studies had shown that a group of paper-and-pencil tests predicted success in learning to fly as well as, and even better than, the interview. Using these tests required an expenditure of approximately 10 man-hours to arrive at prediction scores for 500 men. Adding the individual interviews to the tests did not materially increase the efficiency of prediction, although approximately 750 additional man-hours were required for a Board of three men to conduct 30-minute interviews with 500 candidates for flight instruction. In other words, though the interview showed promise of achieving useful levels of reliability and validity in the selection of civilian pilots, the failure to achieve a level of prediction higher than that obtainable by group techniques makes it difficult to justify the additional cost in time and money involved in conducting such interviews. Considering, for example, the fact that one project of the Committee on Selection and Training of Aircraft Pilots involved the examination, for the Civil Aeronautics Administration, of 67,000 applicants for flight training in 570 centers throughout the United States, it can be seen that such findings have great practical and economic significance.

In Summary.—The use of the “patterned” interview in the selection of salesmen, recent developments in terms of the nondirective interview, and research on recorded interviews have indicated further possibilities in the way of improving the content and methods of interviewing. Although uncritical observers may tend to be overly optimistic, the sum total of evidence on the interview suggests that it is possible to obtain important data on fitness for work from properly conducted interviews. However, considerable research remains to be done, if the interview is to be made a really effective and dependable technique in vocational guidance and selection.

PSYCHOLOGICAL TESTS IN INDIVIDUAL ANALYSIS

From this review of traditional methods it is apparent that certain of them, in improved form, have a legitimate place in a scientific program of selection and vocational guidance. It is also clear that the provision of more dependable objective techniques for measuring vocationally significant traits is still a major need in matching men and occupations.

There is considerable evidence that the psychological test represents a particularly efficient tool for measuring such traits. This statement refers, of course, only to reliable tests that are properly designed, adequately standardized, and fully validated. The statement does not imply that tests can at present completely supplant the interview and other methods commonly used for vocational selection and guidance. However, when a testing program is set up on the basis of adequate research, better and more dependable results can usually be achieved in selection and guidance than are ordinarily attained through the use of only traditional methods.

Varieties of Tests Used in Vocational Guidance and Vocational Selection.—The tests most frequently used in vocational guidance and selection include measures of (a) *proficiency*, (b) *aptitude*, (c) *interest*, (d) *temperament and character*, and (e) *attitudes*.

Proficiency Tests.—Proficiency tests are used to measure the acquired achievements and skills of an applicant for placement or guidance. These include tests of *educational achievement* and *trade tests*.

Trade tests are particularly useful in selection because (a) applicants at times claim skill in occupations with which they have only superficial familiarity, and because (b) previous employment experience cannot be relied upon to provide an adequate index of occupational skill.

Aptitude Tests.—Aptitude may be defined as a condition or set of characteristics regarded as symptomatic of an individual's ability to acquire with training some "usually specific" knowledge, skill, or set of responses. Vocational aptitude tests are designed to measure

those capacities or abilities which enable an individual to profit from training and experience on the job and to develop into a satisfactory worker. They are of particular value as "predictors" in forecasting the productive efficiency of individuals who have had no training or experience in the occupation under consideration.

Interest Tests.—Interest is commonly defined as a tendency to give attention to, to be attracted by, to like and find satisfaction in an activity, object, or person. Tests of vocational interest concern themselves primarily with the degree of intensity of interest in an occupation and with predicting the permanence of that interest. The measurement of interest is of value, particularly in vocational guidance, to indicate (1) whether an individual will like the actual work of the occupation he is considering well enough to become absorbed in it and to remain on it; (2) whether he will find himself among congenial associates, with interests similar to his own; (3) to suggest alternate fields of occupation which may not yet have been seriously considered.

The interest measure may perhaps, in certain instances, also be used in predicting the degree of success in the occupation, but, on the basis of available evidence, and pending the accumulation of further evidence, it seems well to assign to interest tests the responsibility of predicting "satisfaction" rather than degree of productive success on the job.

Personality Tests.—The term personality is commonly used to describe traits of *temperament and character*, temperament being essentially the sum total or blend of affective qualities as they influence others; character referring to the volitional and inhibitory phases of behavior.

Bevington,⁵¹ on the basis of a study designed to establish the relative importance of intellectual, temperamental, economic, and social factors in the success of London working-boys concluded that temperamental factors and character are of much greater importance than intellectual, economic, or social factors in determining a lad's industrial success. Actually the importance of such factors probably varies from job to job. However, there is no doubt that

in the case of practically all jobs a worker must not only have competency; he must get along with people and have certain character qualities of regularity, thoroughness, persistence, honesty, sociability, and the like. There is need for an ever-increasing emphasis upon the objective measurement of such personality traits in vocational guidance and vocational selection.

Attitude Tests.—In the measurement of attitudes, the vocational psychologist is primarily concerned with emotional predisposition or set toward general ideas and concepts expressive of the complexities of personnel relations in industry. Attitudes toward unions, systems of wage payments, general conditions of work are among those which have been considered in the measurement of employee attitudes.

Tests of attitudes have so far been used very sparingly in guidance and selection, but recent investigations indicate a growing recognition of their importance in adjustment to work which may well lead to an extension of attitude measurement in matching men and occupations, quite apart from the measurement of attitudes of employed workers, discussed in Chapter XVII.

THE USE OF TESTS IN VOCATIONAL SELECTION

It is quite impossible, within the limitations of this text, to describe or even list the great number of tests that have been used in measuring vocationally significant traits. A report by the Adjustment Service⁵² of New York City names 25 tests, apart from trade tests, used in examining the first 10,000 cases handled by that agency. More than 75 standard tests, as well as others developed by individual firms, are listed in a survey of industrial experience with tests by the National Industrial Conference Board.⁵³ Pallister⁵⁴ sent a questionnaire to 74 American psychologists asking an opinion on the efficiency of 53 vocational tests. Twenty-three tests are "rated" as efficient by 75 per cent or more of those who expressed a judgment on each.

Such lists represent, of course, only the best opinion of psychologists who have concerned themselves with problems of vocational guidance and selection. In practice, no test has a place in a scientific program of vocational adjustment until its dependability and fore-

casting efficiency have been objectively determined by means of appropriate experimental procedures.⁵⁵ Applying these procedures, psychologists have standardized and validated tests for a large variety of occupational tasks. Below are a few illustrations of progress in this direction.

Tests for Skilled and Semi-skilled Workers.—Representative of tests for skilled occupations is a battery developed by the author for the selection and placement of *electric-substation operators*.⁵⁶ Following a comprehensive job analysis of the job, 84 electric-substation operators, including all operators with less than ten years and more than one year of service, employed by the Philadelphia Electric Company, were classified into *poorest*, *average*, and *best* operators, on the basis of ratings by 13 supervisors and a study of operating errors. An analysis showed that during the period January 1, 1926, to September 20, 1928, the *poorest* group averaged 7.5 times as many errors as the *best*, and 2.5 times as many errors as the *average* group. The *average* group averaged 3 times as many errors as the *best* group.

On the basis of the job analysis, there was developed a battery of tests designed to measure the abilities required for accurate operation, that is, for avoiding errors in operation. These included the *Pursuit Test* and the *Location Test* taken from the MacQuarrie Tests of Mechanical Aptitude, a *Directions Test*, developed by the author, a *Learning Test*, adapted from a laboratory instrument used in experiments on serial response, and 6 other tests. On this battery the average score of *best* operators proved to be 81.4, of *average* operators 69.2, of *poorest* operators 53.5. Moreover, 70.6 per cent of the *best*, 31.5 per cent of the *average*, and only 7.7 per cent of the *poorest* operators had scores above a critical score of 75 set as the passing score in hiring new men.

For the years 1926 to 1928 inclusive, substation operating errors in the metropolitan area of the Philadelphia Electric Company System had averaged 35 per year. The tests were installed for use in hiring new men and in reassigning experienced men on the basis of aptitude in 1928. Operating errors dropped to 20 in 1929; to 18 in 1930; to 12 in 1931. Between 1932 and 1945 inclusive the average number of operating errors per year has been 6. The improve-

ment subsequent to 1932 may be partly credited to programs for retraining experienced operators. However, there is evidence that the use of the tests in selecting and reassigning operators has been the major factor in decreasing the number of operating errors.

Another illustration of the effective use of tests in selecting workers for manual occupations is found in research conducted by Pond for the Scovill Manufacturing Company.⁵⁷ The Scovill program was started late in 1923. Following an extended investigation, tests were introduced in 1926 in hiring metal trade apprentices. As is apparent from Table V, the percentage of satisfactory apprentices,

TABLE V.—SCOVILL MANUFACTURING COMPANY TESTING
PROGRAM FOR SELECTING METAL TRADE APPRENTICES

Progressive Value of Selection *

<i>Dates Hired</i>	<i>Group</i>	<i>Number Hired</i>	<i>Number Satis- factory</i>	<i>Per Cent Satis- factory</i>	<i>Remarks</i>
1-1-20 to 8-31-26	I	57	36	63	Selected by interview only.
	II	50	28	56	
	III	56	35	63	
	Total	163	99	61	
Yearly Groups 9-1-26 to 8-31-30	IV	40	36	90	Selected by interview and the Scovill Classification Test.
	V	44	33	75	
	VI	35	32	91	
	VII	36	28	78	
	Total	155	129	83	
Yearly Groups 9-1-30 to 6-1-37	VIII	13	11	85	Selected by interview, Scovill Classification, MacQuarrie and Wiggly Block Tests
	IX	1	1	100	
	X	3	3	100	
	XI	12	12	100	
	XII	21	19	90	
	XIII	32	28	83	
	XIV	65	62	95	
	Total	147	136	93	

* From *Experience With Employment Tests*, National Industrial Conference Board, Inc.

which had hovered around 61 per cent for the previous five years, increased to 83 per cent. In 1930, after a similar study of additional

tests, two more were added to the battery, and the percentage of satisfactory apprentices increased to about 93 per cent. The foremen who rated the apprentices on their progress and skill in mechanical work never knew the test scores. Not only was there a sharp decrease in the number of unsatisfactory apprentices with each change, but the unsatisfactory workers were laid off earlier, instead of being carried along to fail ultimately, when the foremen realized they could be replaced by better boys.

In the ten years subsequent to 1930 new and higher requirements for potential development of trainees beyond the original goals were set, the number of apprentices trained currently increased, etc. Nevertheless, the percentage of failure, as of 1941, was still about 8 per cent. This fact is attributed, in part, to an enriched interviewing technique which again shows the advantages available from the study and improvement of interviewing methods themselves.

Tests have been used in the selection of workers for a large variety of skilled and semi-skilled occupations such as power-sewing machine operators;⁵⁸ panel dial switchmen,⁵⁹ engine testers, job setters, inspectors, tool workers, etc., in the aircraft industry;⁶⁰ textile (rayon) inspectors;⁶¹ coil winders, solderers;⁶² etc. While many of the studies suffer from defects in the way of small numbers of cases, subjective criteria of undetermined reliability, lack of cross-validation and other faults,⁶³ progress has nevertheless been made toward developing tests useful in identifying individuals especially adapted for manual occupations.

Selection of Clerical Workers.—Clerical occupations have received considerable attention in the occupational testing program. Bills and Pond, in parallel but independent studies carried on in the offices of a life insurance company and of a brass manufacturing plant, respectively, using Bureau Test VI, have found "a definite and consistent relationship between intelligence test scores and advancement in clerical work." ⁶⁴

A study of 250 employees of 6 companies, in service between 5 and 10 years, by a committee of the Life Office Management Association, confirmed the usefulness of Bureau Test VI in predicting promotability and revealed the possibility of eliminating 2 parts of

the test with resulting increase in efficiency of administration and ease of scoring, and with practically no loss in the efficiency of the test as a selection instrument. Findings with the new test show, for example, that an individual with a score of 80 has 4 chances out of 10 of being promoted to the so-called second level of clerical jobs (involving "complicated clerical work"), and no chance at all of promotion to the third level ("decision-making jobs").* With a score above 141, the employee has no chance of remaining in lowest level, that is in jobs involving "simple clerical work"; 4 chances out of 10 of reaching the second level, and 6 out of 10 for reaching the third level of clerical work at the end of five to ten years.⁶⁵

The development of tests for the selection and guidance of clerical workers has received considerable attention in the occupational research program of the United States Employment Service.⁶⁶ Card-punch machine operation furnishes an illustration of work on the prediction of success on a specific clerical job. Using 2 samples of 113 day and 121 night operators, it was found that a highly reliable criterion of errorless production could be predicted by a combination of tests, including Number Comparison (Minnesota); Letter-Digit Substitution; Tapping (MacQuarrie); Dotting (MacQuarrie), and of selected personal history items, at a level of forecasting efficiency represented by a multiple correlation coefficient of .45 for the combined groups. Of workers in the highest third in the criterion group, 52 per cent were also in the highest third on test scores. Of those in the lowest third in the criterion group, 57 per cent were in the lowest third on test scores.

An interesting feature of investigations by the U. S. Employment Service is an attempt to supplement prediction for specific clerical occupations by an analysis of the usefulness of tests in measuring qualifications for the general field of clerical work—particularly for machine clerical tasks. This involves essentially the technique of combining into a single general battery those items which are common to specific job batteries. Such an analysis has been made of data for 562 workers, including samples of coding clerks, card-punch-machine operators, hand transcribers, ten-key adding-machine op-

* For the purposes of this study jobs were classified into 3 levels: I, simple clerical work; II, complicated clerical work; III, decision-making jobs.

erators, bookkeeping-machine operators, calculating-machine operators, and key-actuated calculator operators. Criterion data for each group consisted of either production records or work samples, test items being included in the general battery when they consistently differentiated between the highest, middle, and lowest-third groups of subjects in each group. Validity coefficients ranging from .12 to .64 for the various jobs, with an average of .42, have been obtained from a general clerical battery which includes the Minnesota Clerical Test (number and name comparison); Number Writing items; Arithmetical items, and Letter-Digit items.

Trade tests, particularly of typing and stenographic proficiency, as well as many aptitude tests have been used in studies directed toward the selection and guidance of clerical workers. From an analysis of six clerical tests for general use produced since 1929, Anderson concludes that progress has been made in this area, particularly with respect to establishing test reliability and using larger number of cases for standardization purposes,⁶⁷ although the rigid demands of validation have not been fully met. Although, as he suggests, caution must be exercised by the vocational guidance counselor in drawing conclusions about the probable success of counselees in individual clerical occupations, there is considerable evidence that tests validated for specific situations in industry are contributing to the selection of efficient clerical employees.

Tests for Sales and Allied Occupations.—As indicated on pages 523 ff., a score calculated by weighting specific items of biographical information obtained from an application or personal history blank has proved to be an effective instrument in the selection of salesmen. There is also considerable evidence that personality tests may contribute to the selection of competent salesmen. This does not mean that available standard tests of personality are the best, or even particularly good instruments for measuring the personality qualifications of salesmen. Dodge, for example, gave the Berneuter Personality Inventory to 75 salespeople from a large department store.⁶⁸ The results confirmed the tendency noted in other studies for salespeople to score high in *social dominance*, but no useful correlations were found between such scores and sales success, and none

of the other Berneuter scores showed any greater promise of differentiating between good and poor salespeople. However, an item analysis of the personal inventory made it possible to use 62 of the Berneuter items in setting up a scoring system which differentiated the 18 best salespeople from the 15 poorest without overlapping. Further refinement led to the reduction to 41 of the items to be used in distinguishing between better and poorer salespeople.⁶⁹

Continued research on the selection of life insurance salesmen has led to the addition of a test of Personality Characteristics * to the personal history Rating Chart, referred to on pages 524-25. This test is the outgrowth of a series of studies started by Kornhauser in 1932 which has involved an experimental analysis of 8 subtests, including about 500 items, intended to measure a variety of personality characteristics.⁷⁰ From 1932 to 1935, the research was confined to testing approximately 1000 agents, already in the life insurance business, whose records as agents were known. An analysis of the results showed that only four of the subtests, including approximately 150 items, discriminated between successful and unsuccessful agents.

During 1936, 1937, and 1938, the revised test, designated as a Personnel Blank, was tried out under field conditions on approximately 1433 new employees hired without regard to test results by sales managers of 24 life insurance companies. Careful studies made of the progress of 304 new men who worked as full-time agents under standard conditions, for whom adequate performance records could be obtained, showed that a combination of personal history score, known as a Prediction Scale, and the score on the Personality Characteristics test into an Aptitude Index for Life Insurance Salesmen gave somewhat better and more dependable results than either score alone, especially when the two were weighted differently for the age groups 25 and younger and 26 and above, respectively. Using a combined criterion of sales record and survival rate, the performance of new men rated as *A* (Excellent) on the basis of the Aptitude Index was found to reach the 206 per cent level, as contrasted with the group average of 100 per cent, while the performance of new

* Items referring to interests, attitudes and beliefs as well as those applying to temperament and character are included in this descriptive phrase.

employees rated as *D* or *E* (Fair or Poor) on the basis of the Aptitude Index proved to be at approximately the 40 per cent level.

On the basis of such results the Aptitude Index was adopted as a means of selecting life insurance salesmen by 70 of the 106 life insurance companies that are members of the Life Insurance Sales Research Bureau. Later studies on separate populations have given evidence of continued validity of the combined index in the selection of life insurance salesmen.⁷¹

Research by the United States Employment Service shows that the practice of combining experimentally validated personality items with others can be used to advantage in the selection of department store sales personnel. Employing a battery including 66 interest items, 10 personal data items, and 21 personality items, relationships such as those shown in Table VI were obtained from 3 independent samples totaling 497 salespersons.⁷² Follow-up on a group of contingents yielded further encouraging results.

TABLE VI.—PER CENT OF THE HIGHEST, MIDDLE, AND LOWEST-THIRD GROUPS OF SALESPERSONS, ACCORDING TO BATTERY SCORES, WHO ARE IN THE HIGHEST, MIDDLE, AND LOWEST-THIRD GROUPS ON THE CRITERION SCORES

(Department-Store-Salesperson Studies—497 Subjects)*

<i>Battery Score Group</i>	<i>Per Cent of Subjects in Criterion Score Group</i>		
	<i>Lowest Third</i>	<i>Middle Third</i>	<i>Highest Third</i>
Highest third	20	28	52
Middle third	28	39	33
Lowest third	52	32	16

* From data supplied by U. S. Employment Service.

Although personal history ratings and personality tests have so far given most consistently favorable results in hiring sales personnel, there is evidence that interest inventories represent promising tools

for further research in this field.* In a study on the relation between scores on the Strong Vocational Interest Blank, data were collected from several life insurance companies using this interest inventory in selecting salesmen. Successful life insurance agents scored higher in life insurance interest than unsuccessful agents and than men in general. Although many men with low life insurance interest scores entered the business, few remained in it, and still fewer wrote a satisfactory volume.

It was also found that 85 per cent of agents with an A interest rating wrote \$100,000 or more of insurance a year, in contrast with 51 per cent of B-plus men, 44 per cent of B men, and 25 per cent of C men. In terms of an average volume of paid-for insurance of \$150,000, 67 per cent of A men were successful in contrast to 43 per cent of B-plus men, 21 per cent of B men, and 6 per cent of C men. These data are interpreted by Strong as indicating the fact of genuine relationship between interest and ability, but are described as inadequate for determining the exact degree of relationship.⁷³

In general, it has been shown that the general intelligence or mental alertness test contributes little, if anything, to the selection of competent sales personnel. In studies by McMurry, the intelligence test (Otis Test of Mental Ability) was withdrawn from an experimental battery because it showed no correlations with success as a salesman.⁷⁴ Ohmann reports that the Tremco Manufacturing Company tried out various intelligence tests and that no correlation was found between these (intelligence) tests and sales volume.⁷⁵ On the other hand, it is the experience of the Metropolitan Life Insurance Company that the addition of an intelligence test to a battery does not improve the selection of Best and Average agents, but does eliminate more Poor agents. The intelligence test, according to reports on this company, also eliminates men who are not likely to succeed in the one week's training course, or who not even begin work.⁷⁶ It may be that whether the general intelligence test is useful depends on how much and how quickly the salesman must learn; whether some proportion of men selected for selling must be avail-

* Interest items are also often included in "tailor-made" personality scales used in the selection of sales personnel.

able for promotion; or whether, as Lovett and Richardson suggest, promotion or routine sales is involved,⁷⁷ etc.

In Summary.—There is clear-cut evidence that a variety of tests, as well as personal history items and the “patterned” interview, can be effectively used in the selection of salesmen. However, there is no indication that “sales ability” is a general aptitude and that the same predictors can be used in selecting all kinds of salesmen. It is not to be expected that specific test items, or some test which has shown good results in selecting salesmen in one field, will necessarily give similar results for another type of selling. As in other areas, validation with respect to the particular situation is a basic necessity for the effective use of tests in the selection of salesmen.

Tests for Transportation Workers.—Considerable work has been done in the development of tests for the selection of transportation workers and also for the licensing of private drivers.

Tests for selecting streetcar and autobus operators were introduced by the Paris Combined Transport Services in 1921, and by 1924 the system was in full working order. The number of motor vehicles operating in Paris and its surrounding area showed an increase of 218 per cent between the years 1923 and 1933, while the number of vehicular accidents increased only 155 per cent. During the same period there was an increase of 30 per cent in the number of buses and streetcars, whereas accidents involving these were reduced by 37 per cent. The average number of accidents per operator was reduced from 1.53 in 1923 to 0.27 in 1933. These accomplishments led to a wide extension of the testing program to include conductors, machinist apprentices, dispatchers, etc., requiring the examination of approximately 8000 applicants for such jobs annually.⁷⁸

The Milwaukee Electric Railway and Light Company has reported a reduction in the percentage of men discharged because of accidents from 14.1 per cent to 0.6 per cent following the introduction of the *Viteles Motorman Selection Test* in hiring motormen.⁷⁹ According to a recent report, the use of a score of 90 on a similar test makes it necessary to hire only 105 men to obtain 100 streetcar

operators who are able to complete a rigid training course satisfactorily, whereas with a score below 40 it is necessary to hire 206 men to obtain 100 qualified operators.⁸⁰ Such results not only illustrate the usefulness of tests, but the necessity of determining the forecasting efficiency of scores at various levels.

The Noncommercial Driver and Highway Accidents.—The successful application of psychological methods in decreasing the incidence of motor vehicle accidents in the transportation industry has led to the application of the same methods in the attempt to reduce accidents among the operators of private automobiles. So, for example, extensive experiments have been conducted at Iowa State College,⁸¹ at Harvard University, and in London, under the auspices of the National Institute of Industrial Psychology of Great Britain, to isolate the traits characteristic of "accident repeaters" as contrasted with safe drivers.

For this purpose elaborate apparatus has been constructed, including measures of vigilance, speed estimation, glare, traffic-light color discrimination, depth perception, etc. These have been applied on a large scale throughout the United States and elsewhere through the efforts of automobile clubs, insurance companies, and other organizations interested in motor vehicle accident prevention. In taking these tests people have been led to believe that deficiencies in their performance indicate 'deficiencies in driving ability which may seriously handicap them as safe drivers.

Unfortunately, a careful study of the elaborate data published by DeSilva and others⁸² who are inclined to place great reliance upon such tests in dealing with the driver of the private automobile shows practically no significant relationship between individual performance on these tests and individual safety on the road. 'As valuable as such instruments may be in experimental work, "we have not yet reached the point where the apparatus can distinguish the repeater from the normal driver or predict that the deficient person will have accidents." This statement, quoted from a letter by an investigator formerly attached to the staff of the Harvard Traffic Bureau, more correctly summarizes the actual status of the widely commercialized "tests of driving ability" than do many of the published statements.

Difficulties in Standardizing General Tests of Driving Ability.—

There are many possible reasons for the failure of tests applied to private drivers to produce favorable results comparable to those obtained through the administration of tests to applicants for driving jobs in the transportation industry. It may be that the tests developed in the university research laboratories are not as adequate as those developed by psychologists working in the industrial situation. A perhaps more reasonable explanation is to be found in the fact that experimental groups and accident records are much better controlled in the industrial situation and therefore give more valid findings. The incompetent private driver, too, is in a position to compensate for his deficiencies to an extent impossible in the industrial situation, where schedules must be maintained, cars operated in all kinds of weather, and so on. This gives a better discrimination between "safe" and "unsafe" drivers in the transportation industry than can be obtained in samplings of private automobile operators.

Another important limitation is the fact that the so-called "tests of driving ability" make an attempt to reproduce conditions on the road, but do not and perhaps cannot actually succeed in doing so. So, for example, in the laboratory tests of reaction time, the driver's attention is concentrated on one point, while on the road the field of attention must be kept broad.⁸³ There are cues on the road not present in the laboratory test. Because of such factors, increasing attention has been given to standardized road tests and similar tests of driving proficiency both for the selection of commercial vehicle drivers and in licensing drivers of private cars. In many instances these are adaptations of a trade list of driving skill developed by the Army during World War I.

A standard road test of driving skill, requiring 15 to 20 minutes of observation of the driver in a standard situation, was also developed by the Army during World War II. This road test was used as the criterion in approximately 40 studies of various predictors, including a number, such as the AAA Glare Test, the DeSilva Glarometer, and the Driver-Vigilance Apparatus, which have been recommended for general use in the selection and licensing of motor vehicle drivers.⁸⁴ In a validation study of 156 men with a battery which included eight psychophysical tests and five items of personal

data, the road test was found to be the best predictor of rating on a second road test three months later. Two paper and pencil group tests, a Driver Experience Inventory, and a Driver Information Test showed promise in the experimental studies. In general, some of the psychophysical tests, such as the scores on the Driver-Vigilance Apparatus, showed high split-half reliabilities, but most of the repeat reliabilities were low. Validity for such tests also proved to be low.

Selection of Pilots.—With the advent of air transport increasing attention has been given to the use of tests and similar psychological techniques in the selection of pilots. Considerable research in this area has been carried on since 1939 by the National Research Council, Committee on Aviation Psychology,* with funds provided by the Civil Aeronautics Administration.⁸⁵ In addition, research done by the military forces has produced findings significant from the viewpoint of civil aviation. Illustrative of these are results reported by the Army Air Forces from an experimental program in which approximately 1300 men were assigned to pilot training regardless of scores made on the Aircrew Classification Battery used in determining whether aviation cadets were most suited for pilot, navigator, or bombardier training. This test battery⁸⁶ included paper and pencil tests that could be administered to several hundred men at one time and apparatus tests requiring individual attention for small groups of four candidates, standardized conditions, and very carefully trained testers. Each candidate was given all the tests, and separate aptitude scores, called *stanines*, ranging from 9 (high) to 1 (low), were computed to predict each candidate's chances of success as a pilot, navigator, and bombardier, respectively. For the group unscreened by aptitude tests the pilot validity of the pilot stanine was about 0.66. The effectiveness of the stanine for purposes of prediction is further shown by the fact that of 150 men with pilot stanines of 1, not a single individual was graduated from advanced flying training. Only 16 out of 291 men with stanines of 2 or 3 were graduated. In contrast, of 98 men with augmented

* Formerly known as the Committee on Selection and Training of Aircraft Pilots.

pilot stanines of 8 or 9 only 15 were eliminated from testable reasons (flying, deficiency, fear, and own request).

As indicated above, these findings are of importance from the viewpoint of selecting civilian airline pilots, although separate validation is necessary before any or all of the AAF tests can be used for this purpose. The Aircrew Classification Battery also illustrates the effective use of a single battery for *differential occupational classification*, since the same tests were used in classifying personnel for three different tasks. This, of course, is the purpose of the United States Employment Service General Aptitude Test Battery, discussed on pages 508 and 520, which represents a similar approach intended to provide a tool for the differential classification of aptitude for a large variety of industrial and business occupations.

EVALUATION OF PSYCHOLOGICAL TESTS IN VOCATIONAL GUIDANCE

Integration of Experiments in Vocational Guidance and Vocational Selection.—Largely because of the greater complexity of the problem, the experimental validation of tests and allied psychological techniques has not proceeded so far in the field of vocational guidance as in that of vocational selection. However, a few significant studies are available.

In England, Farmer and Chambers, of the Industrial Health Research Board, have attempted an integration of the two fields of research through the intensive analysis of a series of vocational experiments.⁸⁷ Each experiment in vocational selection, they point out, may be made to serve a wider purpose if it is compared with other similar experiments, especially if the same tests were used in each of several experiments. In comparing results in such a way the value of particular tests for vocational selection can be considerably increased.

Starting with these premises, tests of various types were given to 2731 males aged from 14-38, engaged in occupations of all degrees of skill, from highly skilled to routine manual work. Test results were correlated with measures of practical proficiency in each occupation. The investigation served to confirm the usefulness of intelligence and mechanical aptitude tests in measuring fitness for skilled

trades while showing the relative ineffectiveness of sensorimotor tests for this purpose. Tests of intelligence and of aesthetokinetic coordination prove to be useful in guiding those with only an elementary education into semiskilled occupations. The results suggest that good results are not likely to be obtained by using tests in placing men in unskilled work. Of particular significance for vocational guidance is the finding that psychological tests correlate more closely with occupational proficiency when maturity has been reached than with proficiency immediately at the end of training.

Evaluation of the "Total Situation" in Vocational Guidance.—So far, the discussion has been limited to the experimental evaluation of individual specific tools in gauging fitness for work. It is seldom, however, that the interview or the psychological test or some other tool is used as the sole basis for vocational guidance and selection. For this reason, investigators have turned to the study of the "total situation"—to inquiries designed to compare results obtained when only usual methods are employed with those achieved when traditional techniques are supplemented by psychological procedures.

The Main London Experiment.—This has been the aim of a series of English experiments. In one of these,⁸⁸ conducted in London during the years 1925-29 inclusive, 1200 pupils about to leave elementary school were divided by chance into two groups. Children in the *control* group were given vocational guidance at school or "choice of employment" conferences in the ordinary way, while in counseling the *tested* group, dependence was placed upon the results of a psychological test supplemented by an improved interview, a careful analysis and evaluation of school records, medical records, social findings, etc.

For a period of between two-and-a-half and four years regular inquiries were made into the vocational progress of children in both groups. Many interesting facts were revealed by this follow-up. For example, of *tested* children who entered clerical work upon recommendation by the psychologists, 75 per cent retained their first posts. The corresponding figure for those who took up clerical work

when it was not recommended was 35 per cent. In the *control* group, only 44 per cent of the children who entered clerical work on the advice of the school conference retained their first jobs, while of those who entered this work against the advice of the conference approximately the same percentage, 43 per cent, made no change of job.

In analyzing employers' reports, it was found that as the jobs occupied by the children in the *tested* group became more and more unlike the jobs recommended, the percentages of good reports tended to decrease regularly. In the *control* group this relation was less well defined. Reports from children showed that those entering fields of work recommended to them seemed generally more satisfied with their work. This was particularly true of children in the *tested* group. In general, the inquiry findings showed, *first that vocational advising is feasible, the young people whose occupations are the most similar to those advised tending to be most successful; and secondly, that the newer psychological technique of vocational guidance is distinctly more dependable than the ordinary procedure followed by the school conference.*

The Birmingham Experiment.—In a later experiment,⁸⁹ in Birmingham, 328 children, divided by chance into *control* and *tested* groups, were treated in much the same way as in the main London experiment and followed up for two years subsequent to graduation from the elementary school. Here two investigators cooperated closely in advising the children—one a vocational psychologist, the other an assistant organizer in the Juvenile Employment Department who had received special training in psychological methods. Each child in the *tested* group was examined by both investigators. Both investigators also took part in counseling every child in the *control* group, making such recommendations as they could without the aid of special psychological methods. Consequently, any superiority in the adjustment of the *tested* children can be regarded as probably due to the greater dependability of the psychological method of advising and not to the superior qualifications of the persons employing that method. From whatever angle the data of this investigation are studies, the same indications appeared clearly—namely, that

tested children show more satisfactory occupational adjustment than do children from the *control group*.

In a subsequent investigation⁹⁰ an experimental group of 426 *tested* children and a *control group* including 394 children were followed-up for a period of from two to four years. Children who followed the advice given by counselors held their jobs longer than those who did not follow the advice. Those in the *tested* group who had originally entered work not in accordance with the advice given tended to drift from job to job toward those in accordance with the advice given. This trend was not evident in the case of children in the *control group*. Of children in the *tested* group who had accepted the advice, 91 per cent reported satisfaction with their work at the end of two years, in contrast with 30 per cent of those who failed to accept the counselor's recommendation. Corresponding figures for the *control group* were 69 per cent and 76 per cent, respectively. Employers' reports revealed unsatisfactory placements in the case of 4 per cent of children in the *tested* group who had followed the advice given and in the case of 21 per cent who had not done so. Corresponding figures for the *control group* were 11 per cent and 10 per cent, respectively.

The Clinical Approach in Vocational Guidance.—Considered as a whole, the results of the London and Birmingham investigations strongly suggest that the ordinary methods of advising children on the choice of work are definitely inferior to those practiced by psychologists. Similar experiments at Fife and at the Wormwood Scrubs Boys' Prison⁹¹ have produced additional evidence of the value of the psychological examination in guidance.

In considering these investigations, it is important to note that they represent not an evaluation of traditional methods in comparison with psychological tests, but an evaluation of the ordinary method with what the English call the method of the "psychological examination," known in this country as the "clinical method" in psychological practice. In this clinical approach, early advocated by the author, use is made of psychological tests and other objective techniques, but the emphasis is upon the complete study of the individual—an individual looked upon as an integrated organization of be-

havior patterns—as a “whole” personality against a background of social and economic factors affecting vocational adjustment.⁹²

Contrasts with the “Thorndike” Study.—In this and other respects the English studies differ markedly from an ill-conceived attempt by Thorndike and his associates⁹³ to determine the value of psychological tests in vocational guidance by studying the progress of children to whom no advice had been given, but who had each taken an intelligence test, a test of “mechanical ability” and a test of “clerical capacity.” This investigation started with 2225 children, 14 years of age, tested in 1921-22. Eight or more years later the educational and work histories of these children were studied in order to determine the relationship of school record and test results to (1) educational progress, and (2) success in clerical, mechanical, and professional work, respectively.

The study involved a detailed analysis, by correlation and other techniques, of interrelationships among these variables. The outcome includes essentially a long series of zero correlations and the conclusions that the results do not support “the opinions of those enthusiasts for vocational guidance who assume that an examination of a boy or girl of 14 and a study of his school record will enable a counselor to estimate his fitness to succeed in this, that, and the other sort of work.”

This study has been legitimately criticized on many grounds. The experimental situation failed to duplicate the actual guidance situation, where test results are used only in combination with other data as a basis for individual guidance by a competent counselor. There is serious question as to whether the tests employed are valid measures of the aptitudes considered in the investigation. The possible influence of differential training was entirely neglected. The failure to use control groups of untested individuals, as a way of comparing the “psychological” with the “traditional” method of guidance, greatly detracts from the significance and value of the sweeping conclusions drawn from the data by those who collaborated in the investigation. With these defects stands the inadequacy of the criteria of vocational success employed by the investigator.

The results obtained by vocational psychologists must depend upon the suitability of their techniques. Starting with unsuitable techniques and inadequate criteria for follow-up, Thorndike has obtained results which *can* be interpreted as demonstrating the unsuitability of *his* methods, but *not* the impracticability of scientific vocational guidance. More thoughtful investigators, selecting more suitable tests and allied techniques, have demonstrated clearly that both guidance and selection based on the application of improved psychological methods are practical and productive in promoting vocational adjustment.

In Conclusion.—Investigations described above are chiefly concerned with specific contributions in the way of improved tools and procedures for use in vocational guidance and vocational selection. It must be recalled that these are largely the outcome of extensive research on fundamental psychological problems involved in mental measurement and individual differentiation discussed elsewhere in this text. Progress in fitting workers to jobs as one step in promoting the efficiency and adjustment of people at work calls for extensive evaluation of predictions made through the use of particular psychological methods. A considerable investment of time, effort, and funds is required to check such prediction on a large scale.⁹⁴ While there was lively and productive activity in designing tests and in devising selection procedures during World War II, all involving prediction,⁶ the urgency of immediate jobs to be done generally crowded out the possibility of long-term studies of vocational predictions such as those represented by the London and Birmingham studies. Current activities in vocational selection and guidance, including the widespread Veterans Administration program of vocational counseling for veterans,⁹⁵ carry a rich promise of valuable outcomes from further studies of vocational predictions in the years ahead.

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CHAPTER XVII

VOCATIONAL PSYCHOLOGY (MAINTAINING FITNESS AT WORK)

By MORRIS S. VITELES, *University of Pennsylvania*

The selection and placement of competent workers, discussed in the preceding chapter, represent only the first step in insuring efficiency and adjustment on the job. After the worker is employed, much remains to be done to make sure that he will fully use his capacity under conditions favorable to ease, safety, and satisfaction at work.

PSYCHOLOGY AND INDUSTRIAL TRAINING

Adequate training is the first essential in accomplishing these objectives. An individual who is fully qualified for the job may become an inefficient worker because he has not been properly trained. The recognition of the importance of training is leading industry to substitute systematic programs of training for the traditional procedure of "breaking-in" a new worker, in which instruction was largely left to the caprice of the foreman or of some other minor official.

Concentrated versus Distributed Practice in the Acquisition of Industrial Skills.—There are many ways in which basic principles of learning growing out of laboratory investigations, such as those discussed in Chapter V, and research on learning in the industrial situation can be used to advantage in improving the industrial training program. So, for example, findings from experiments on *distributed* versus *concentrated* learning have shown that generally the total number of hours required for learning can be reduced and the level of performance increased by using short prac-

tice sessions spaced over a long period instead of longer practice sessions massed into a short period of time.

In perfecting industrial skills, as in other forms of learning, there is a point beyond which further practice during one time interval produces no effective return. Because distributed practice provides more opportunity for the consolidation and organization of the patterns of muscular response characterizing industrial skill, its beneficial effect may continue for long periods, while prolonged practice periods may actually be harmful.

The practical implications of this principle appear in an experiment by Henshaw and Holman¹ who made use of 3 groups of 30 subjects in studying the influence of varying distributions of practice upon learning a chain-assembly operation. Each group worked 80 minutes each morning on this task. During the afternoon Group I spent an additional 80 minutes in assembling chains; Group II spent the time in cartridge filling; and Group III remained unemployed. After two weeks of work the performance on chain assembly of the 3 groups was found to be practically identical in spite of the fact that Group I had actually twice as much practice on chain assembly as Groups II and III. After a lapse of a few months, 5 subjects from Groups II and III were again employed at chain assembly for 80 minutes each morning for an additional two weeks. After an initial drop in amount of work done, due to the interruption of practice, this group continued to improve to the point where the rate of output was considerably above that of Group I after the same total time had been spent in practice.

The results show that the lengthening of the daily training period beyond a certain point, in the case of this task, had no beneficial effect on learning. Similar findings have been reported from a comparison of two code-teaching schedules in the Radio Training Section, B. and S.C., A.S.F.T.C., Camp Crowder, Missouri.² One group of code students, numbering 165 men, was given 4 hours of code practice daily throughout their prescribed eight weeks of low-speed radio operator training, concurrently with instruction in allied subjects. Another group of 355 students was taught code 7 hours a day for five weeks, after which they received instruction in allied subjects only for the remaining three weeks of training.

In the treatment of results it was necessary for the investigators to make corrections for differences in tape content and in training methods used in the early phases of training for the two groups. Nevertheless, the results of this study are clear in pointing to the superiority of 4, as opposed to 7 hours of code practice daily. The hours required to pass speeds of 10, 12, 15, and 18 words per minute were found to be significantly less for the 4-hour students and, as appears in Table VII, the percentage of men passing the higher speeds was greater in this group. Especially important is the fact that the 4-hour group achieved as much as the 7-hour group in 5 weeks of training. In other words, the 4-hour men made as much progress daily as the 7-hour men, in spite of the 3-hour difference in practice time. The conclusion is warranted that, under conditions of instruction similar to those existing in this school, a 7-hour day of code practice is definitely wasteful of training time. Even 4 hours of daily practice may not be optimal, as compared with 2 or 3 hours, but this period is nevertheless more economical than the 7-hour training program.

TABLE VII.—STANDING AT THE END OF TRAINING*

<i>Speeds Passed (Words per Minute)</i>	<i>Seven-Hour Group</i>		<i>Four-Hour Group</i>	
	<i>No. Cases</i>	<i>Per Cent</i>	<i>No. Cases</i>	<i>Per Cent</i>
7 WPM	15	4.23	0	
10 WPM	58	16.34	3	1.82
12 WPM	151	42.53	22	13.33
15 WPM	112	31.55	71	43.03
18 WPM	16	4.51	36	21.82
20 WPM	3	.84	33	20.00
TOTAL	355	100.00	165	100.00

* From Keller and Estes.

Over-all Length of the Training Program.—It is apparent from the above discussion that the experimental study of learning by psychological methods is of value not only in determining the optimum arrangement of the training period but also the optimum length of the total time to be devoted to training in a specific industrial task. Meyer,³ for example, examined the practice curves of 3

workers on 3 machine operations. On one, production time per unit decreased to approximately 65 per cent of the initial time by the end of 30 days, beyond which no further improvement appeared. On the second, the integration of response at a fixed level did not appear until approximately the 40th day of work and reached a consistent plateau level only after 50 days of work, when production time was decreased to approximately 60 per cent of that required at the beginning of the work period. On the third operation, involving more complex machine work, there was no sign of leveling-off of production at the end of approximately 45 days, when observations were discontinued, in spite of the fact that production time per unit had decreased to approximately 38 per cent of the initial time. On the other hand, experiments by Engel⁴ and others indicate that in the acquisition of industrial skills, as in other instances of learning, waste may ensue from excessive overlearning.

The practical advantages of experimentally determining the optimum total training time are illustrated in experiments in the training of radar operators conducted during World War II. One such investigation, designed to test the effectiveness of a synthetic device (Philco Trainer) as a trainer, showed that 88 per cent of the over-all learning during half-hour training sessions on 7 consecutive days occurred during the first 4 days. Although learning was still in progress at the end of the seventh day of training, only slight improvement could be expected by carrying training beyond that point. From this experiment it was concluded that where time for training is at a premium, training in this device might well be discontinued at the end of the fourth day.⁵

In contrast are findings from a study conducted to determine the amount of aerial training required for students to achieve the limits of their proficiency in radar bombing.⁶ In this, 20 men were given approximately 150 hours of aerial practice beyond the 30 to 35 hours of training in the standard radar observer curriculum. Fig. 25, which shows the average circular errors (CE's) plotted at the mid-point of successive 25-hour periods of training, makes clear that learning begins to level off only after 65 hours of training (about 35 hours beyond the standard training period) and does not reach its terminal plateau until after 115 hours of training. From the find-

ings of this experiment it was concluded that approximately 85 hours beyond the usual training period were required "to reach such a level of proficiency that the circular error on the first run of each mission was approximately equal to the average for the whole mission," although it is also suggested that total training time might also be decreased by a revision of the basic training program.

Such experiments have practical implications for industry in demonstrating the necessity for conducting studies designed to establish the optimum total training time for each job at that point beyond

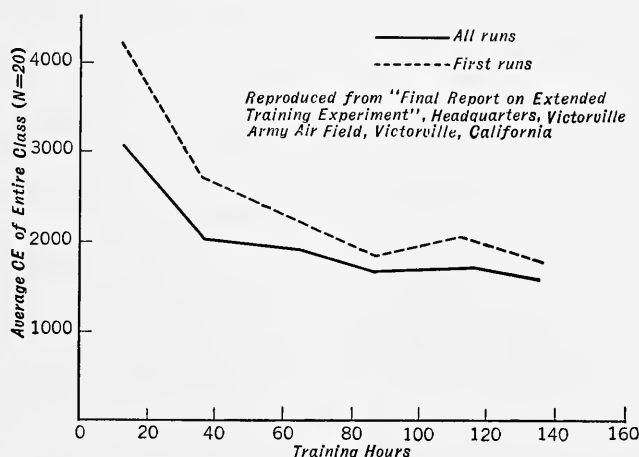


FIG. 25.—THE EFFECTS OF EXTENDED AERIAL TRAINING IN RADAR BOMBING.
(From "Psychological Effects on Radar Observation Training.")

which further training, under given incentives and conditions of work, will produce no significant increase in rate of work or improvement in quality of work.

Industrial Application of the Practice Curve.—It is to be observed that the practice curve, and more particularly the plateau, can be used as a criterion in determining when the effect of practice has decreased to the point where, for all practical purposes, training may be discontinued. Observations of the plateau effect have also been used in determining the point in the training program at which incentives, financial or other, should be introduced to prevent the

consolidation of performance at a rate markedly below the limit of improvement. Kitson,⁷ for example, has demonstrated the existence of arrested progress in learning in an experiment involving 40 experienced hand compositors with an average experience of 8 years. The institution of a wage incentive plan resulted in a doubling of production within a period of a year and a half. According to Kitson, the incentive provoked spurts of learning, leading to settlement at a higher plateau level which, it is conceivable, might be raised still further with further chances in motivation or conditions of work.*

The implications for industrial training of the influence of incentives upon learning have been considered by Mace⁸ in experiments, involving 88 university students learning complicated arithmetical operations, designed, in part, to compare rates of improvement (a) when the subject attempted to meet a specified "absolute" standard of performance; and (b) when the subject undertook to improve upon his previous performance, etc. From these experiments Mace concludes that best results in learning are obtained when (1) the beginner is provided with a standard well within his capacity; and (2) subsequent standards are adjusted to the performance of the worker so that continued progress may be added to the consciousness of initial achievement. The superior performance of subjects learning under such conditions, according to Mace, is due in lesser part to the intensification of the will-to-work and in larger part to the prolongation of this will-to-work throughout the practice period. These findings and conclusions, it may be noted, are in harmony with those which might be expected from the operation of the "level of aspiration" postulated by Hoppe.⁹

It is apparent that practice curves, properly employed, can furnish invaluable aid in promoting the acquisition of industrial skill. They may perhaps also be used to supplement selection techniques in predicting from the character of the curve at an early stage of practice the ultimate performance of the new worker. Evidence to this effect is found in a study intended to show to what extent reclassification of radio-code students can be predicted from their performance during the early stages of training. Subjects of this experiment were 342 students without previous code experience attending two Signal

* See page 453.

Corps code schools.¹⁰ The analysis of practice curves showed that if all men who required more than 32 hours after beginning basic code to pass 5 groups per minute (GPM) were dropped from the training program, about 68 per cent of ultimate failures would be eliminated with a loss of only about 5 per cent of potentially successful radio code operators.

Poppelreuter,¹¹ of Germany, early urged the use of practice curves as preferable to short psychological tests of the analytic type in forecasting ultimate performance. Although many difficulties of a practical and theoretical nature must be considered before it can be widely used,¹² findings such as those presented above point to the usefulness of this procedure. Apart from its other functions in industry, the practice curve also furnishes a record of improvement which can be used in supplying learners with the *knowledge of results* useful in furthering continued improvement with practice. There are particularly important implications here for industry because many experiments, including recent work by Macpherson, Dees and Grindley,¹³ indicate clearly that giving the learner knowledge of results is a practical, cheap and effective way of improving efficiency and training.

Whole versus Part Method in Acquiring Industrial Skill.

—Experiments on the *whole* versus the *part method* of learning find their application in industry in determining whether a learner should be taught a new job as a whole or whether various parts should be learned separately and then fitted together. In the application of the part method¹⁴ a learner is required to practice the separate operations of a task before attempting to do the task as a whole. So, for example, the machinist apprentice practices filing on a special device providing a graphic record of movement, pressure, etc. He then goes on to develop accuracy in hammering by aiming at points placed on a lead block. Only after the required level of efficiency has been reached on each separate operation is the apprentice given an opportunity to coordinate these skills by work on the whole task.

In contrast is the more common "modified whole" method of machinist apprentice training which puts the apprentice to work on the whole process of filing and hammering and measuring a piece of

metal to produce a useful tool or object. In this training system, the complexity of the task is increased with the years of apprenticeship, but each task is performed as a whole, all of the constituent skills being practiced in proper sequence.

Experimental Studies of Whole and Part Methods of Training.—Experimental studies of this problem include an investigation by Beeby¹⁵ who measured the effectiveness of training by whole and parts by the method of *simultaneous combination*, where the right hand and left hand, having been separately trained in tracing squares on the right and left side of the apparatus respectively, were forced to perform these movements together, and by *simultaneous division*, in which the hands having been trained to perform the movements together were required to perform them separately. From his findings Beeby concludes that the “whole” method of learning a muscular habit is preferable to the “part” method, although he also points to the need of further research in order to determine the degree of complexity of movement at which the disadvantages of the “whole” method outweigh its advantages.

Typical of experiments in industry is a study by Dilger¹⁶ who compared two methods of instruction in the use of the file. One group of 15 subjects practiced filing for one-half hour each day, 2 times a day, for a period of 16 days, under the ordinary conditions of production, in preparing metal pieces of standard thickness with flat surfaces free from irregularities. The second group, matched with the first on the basis of psychological test scores, alternated practice on filing on a special apparatus with practice on measuring.

At the end of 16 days each worker was given 2 work problems requiring from 3 to 8 hours for completion. The performance of the first group proved to be superior to that of the second, leading to the conclusion that the most desirable training program is that which promptly gives the worker practical “whole” tasks of progressive difficulty to be done under direct supervision, supplemented from time to time by test problems.

On the basis of laboratory and industrial studies there appears reason for questioning the usefulness of the part method in industry. A modified whole method may be preferable to the whole method

where the task is very complex but even in such instances, as Link has pointed out, "it is best to give an individual an idea of the process as a whole, even if it is only a superficial idea." ¹⁷ After this, if necessary, the task can be split into "natural subdivisions," each subdivision being kept, however, as large as possible in order to take advantage of the associations between movements inherent in the task as a whole.

Practice in the "Best Method of Work."—Regardless of whether the whole or part method of learning is employed; whether training is concentrated or distributed in the development of industrial skill, workers must be taught and must practice only good methods of work. Left to their own resources, or given only casual training, workers may as readily adopt a relatively difficult, wasteful method of work as choose a method designed to promote efficiency, ease, and safety at work. For example, among "speckers" in the textile industry the author observed 3 distinct methods of manipulating tweezers in the removal of small specks of foreign matter from finished flannel cloth. Most of the girls, who had been given little guidance in learning the job, had "hit upon" a tapping wrist movement which was fatiguing, time-consuming, and detrimental to quality of production. Few in the group employed a rolling movement of the wrist, which represents the "best method" of work for this task.

The significance of such differences in working methods becomes apparent when it is found, as Barnes ¹⁸ has demonstrated, that the time required for grasping a small object, such as a thin steel washer frequently used in industrial operations, as a preliminary to picking it up and carrying it, may be 20 or 30 times as long as that required for grasping when the same object is to be moved by sliding. In an experimental study of an assembly task, in which a lock washer, a steel washer, and a rubber washer were assembled onto a bolt $\frac{3}{8}$ inch in diameter and one inch long, the combined time for "grasp and carry" was twice as great as that for "grasp and slide."

The problem in planning correct methods of work, in the interest of safety as well as efficiency, is to select the "best way" of performing each task. This problem is discussed on pages 591 f., which also refer to the controversy between industrial engineers and psy-

chologists with respect to the "*one best way* of work." For the purposes of this section it need merely be noted that the development of work habits to provide economy of effort and time, and to promote safety of work, involves not restrictive and rigid requirements as to methods of work, but reasonable conformity to a standard method designed in accordance with the principles listed on pages 593 f.

Transfer Effects in Industrial Training.—A not uncommon practice in industry is to employ practice on miniature models of equipment or on analogous tasks in training workers. Miniature models of a locomotive and a train of cars have been employed in instructing railroad engineers how to apply brakes to avoid both excessive jolting and accident. In training electric substation operators, miniature boards have been constructed in the belief that by practicing on these the operator will acquire skill in the manipulation of the actual switches and other apparatus found in the electric substation. In training bill sorters, an attempt has been made to facilitate learning by practice on the analogous task of sorting cards with different designs. Exponents of a so-called "functional method" of training in U.S.S.R provide practice on cancellation tests and substitution tests of increasing difficulty in order to develop speed and accuracy in inspecting overshoes. Practice on "judgment" tests is given to electric substation operators in training them to solve problems arising in the course of their work.

The usual assumption in such training is that the effect of practice in one specific activity may be transferred to another activity of the same kind, even to one involving the use of different materials. Laboratory investigations on transfer of the type described elsewhere in this text* have been supplemented by studies involving industrial tasks. In one experiment, by Langdon and Yates,¹⁹ 32 subjects spent 80 minutes each morning and afternoon for 2 weeks on assembling bicycle chains. Before training was started and at the end of the 2 weeks each subject in this *experimental group* was given a series of 9 motor tests involving match insertion, threading links, placing rings on a rod, etc.

The same tests were given in the same order and at the same intervals to a *control group* of 28 subjects who had received no train-

* See pages 161-165.

ing on bicycle chain assembly. The experimental group showed no greater improvement on the allied tasks, that is, the transfer tests, than did the control group. Similar results on another experiment, involving the estimation of the size of steel balls lifted on a spoon, supported further the conclusions reached by these investigators that the effect of training in manual dexterity is specific and that there is no transfer from repetitive practice in one specialized task to another.

The widespread use of synthetic trainers during World War II provided opportunities for studying the extent of transfer of training on such devices, simulating the task to be performed, to the task itself. One such investigation, conducted under the direction of the author, showed that a Range Estimation Trainer, as originally constructed and distributed to training stations, provided cues which were not present when a man at a gun undertakes to estimate the range of a plane flying in the air.²⁰ Actually, it was found that men could estimate range as accurately on the synthetic device when the miniature plane was removed as when it was present in the device.

Following improvements in the device made as the result of preliminary research, it was shown that training on the synthetic device did make some contribution to the improvement of range estimation on the firing line. However, additional research showed that much better results could be obtained from approximately 45 minutes of instruction on the firing line than followed from 2 hours of instruction on the synthetic device.²¹ Men who received training both on the synthetic device and on the firing line did no better in estimating range than those who received training on the firing line alone. Moreover, there was better retention of training on the firing line, since the performance after a lapse of 11 days by those trained on the firing line was found to be superior to the performance one day after training of those trained on the synthetic device only.

Transfer Effects in Attitudes and Methods of Work.—Such findings and conclusions suggest that training on the task itself, under actual conditions of work, is the most certain method of promoting the *integration of skills* necessary for the successful performance of a task. There still remains the question of possible transfer resulting

from an emphasis during training upon attitudes and basic principles or "generalizations." From experiments involving the assembly and wiring of an electric lampholder, Cox concluded that "skill, developed by the mere repetition of one manual operation, confers little advantage on the performance of other operations that may be subsequently undertaken."²² On the other hand, Cox found that systematic training in the general principles underlying manual control, illustrated by specific examples from manual operations, tends to improve performance over a wide range of manual activity. There is apparent here, even in simple manual tasks, transfer effects in terms of "ideas" and "attitudes," such as have appeared in experimental investigations in other fields, and which may have a wide application in "breaking-in" new employees and in the development of good work-habits in young people. It is possible, for example, that the beneficial results reported for the so-called "functional method of training" in U.S.S.R reflect a gain in the way of attitudes of carefulness and precision transferred from practice on operations somewhat analogous to the work for which "technically illiterate" Russian workers, without experience in handling modern equipment or tools, were being trained.

An investigation by Shaw in the plant of the Metropolitan Vickers Electric Company (Manchester, England) illustrates further the advantages, in the form possibly of transfer effects, of a method of training conducive to the development of good attitudes and to generalization.²³ In this, different methods were used training two groups of workers, matched for ability, in the assembly of electric bulbs. The *control* group was taught by the method then in use in the plant—namely, that of merely showing the worker how to do the job and then giving her an opportunity for routine practice of the operation under supervision. In the case of the *experimental* group, there was preliminary discussion of why the job was done in the particular way; explanations throughout instruction of the reasons for using a particular tool, for holding the tool at a given angle, and of other details of the job; and systematic demonstrations of the correct method of work. In other words, workers in the *experimental* group were well trained on the HOWS and the WHYS of the

working methods. While preliminary training of the *experimental* group took a little more time than that required for the *control* group, the former was able to reach in 40 practice trials a level of production attained only after 300 practice trials by the *control* group.

Transfer Effects and Technological Change.—The general problem of transfer is of particular interest to the vocational psychologist because of the increasing mobility demanded of workers in a changing industrial civilization. Koepke,²⁴ for example, has suggested that an immediate need in training for industry is the development of “bimanuifiability,” or skill in the simultaneous use of the two hands, to facilitate adjustment to a variety of semiskilled jobs in industry and easy transfer and adaptation to new tasks, new machines, new methods of work associated with rapid technological advances in industry. It may well be that in vocational training greater emphasis should be placed upon work attitudes and upon general principles, useful in many semiskilled jobs, which would make the services of an individual more marketable than they are under a system of vocational education which stresses expertness in a single specific task or job. Further research on this problem is needed as a preliminary step in the formulation of an adequate philosophy and in the development of suitable methods of vocational training and re-education as aids in promoting individual adjustment to work in the face of technological and other changes.

In Summary.—Training methods in industry have been improved by the application of principles of learning developed on the basis of psychological experimentation. In many diverse industries significant gains in efficiency have followed from the rationalization of the training program. These include reductions in time taken to pack chocolates; increased production in roughing silverware and in the output of coal; decrease in time required for training machinist apprentices, electric linemen, and other workers.²⁵ Experiments conducted during World War II in training for specific military tasks have further demonstrated the benefits which can be achieved from the consideration of basic psychological principles of learning. How-

ever, much more is needed in the way of direct research in the industrial situation to permit full utilization of the possibilities of applied psychology in increasing the effectiveness and reducing the cost of training workers.

PSYCHOLOGICAL TECHNIQUES IN ACCIDENT PREVENTION

In 1948 there were approximately 16,500 fatal accidents and almost 2 million disabling occupational accidents in American industry. Occupational injuries cost the nation about $2\frac{1}{2}$ billion dollars in 1948. It is estimated that approximately 90 per cent of these resulted from failure of the human element. Motor vehicles, operated for business and pleasure, accounted for approximately 32,000 deaths, 1,100,000 personal injuries, and an economic loss of about 3 billion dollars.²⁶ It has been frequently stated that only about 5 per cent of motor vehicle accidents result from mechanical failures; 95 per cent being attributable to inadequacies of the man operating the machine!

In reducing the number of accidents caused by human failures, the organized safety movement has resorted largely to educational campaigns, competitions, posters, and other forms of mass propaganda. These have been effective in lowering both the frequency and severity of accidents in industry. However, psychological experimentation indicates very definitely that mass propaganda must be supplemented by a more individualized approach if accidents are to be reduced to a minimum.

Individual Differences in "Accident Proneness."—This conclusion is based on experimental findings which show that accidents do not distribute themselves by chance, but that they happen frequently to some men and infrequently to others. Studies in diverse industries have revealed the existence in some individuals of a heightened susceptibility to accident, or "accident-proneness" from which others are relatively free.

Greenwood and Woods,²⁷ of the Industrial Fatigue Research Board of Great Britain, were among the first to study these individual

differences in accident susceptibility. They started their investigations with three hypotheses:

(1) *A hypothesis of simple chance distribution*, which assumes that inequality in accident rates is due to a chance distribution and that it is purely a matter of "accident," in the proper sense of the word.

(2) *A hypothesis of biased distribution*, which assumes that having one accident alters the chance of the same individual having another accident by either lessening or increasing his susceptibility to accident.

(3) *A distribution of unequal liability hypothesis*, which assumes that some individuals are more liable to accidents than others under equal conditions of exposure to risk, whether or not they have sustained any previous accident. This presupposes that there is something in the individual quite apart from any accidents he may have had that makes him more liable than others to sustain accidents.

A comparison of distributions of industrial accidents with theoretical distributions showed that the first hypothesis failed to account for the observed distributions of accidents. The theoretical distributions of the other two hypotheses coincided fairly well with the actual distributions of accidents in industry but, on the whole, the assumption of unequal liability was superior to the other.

Early Experimental Data on Accident-Proneness.—In order further to test this finding, accidents sustained by individuals in one period were compared with accidents sustained by the same individuals in another period. If involvement in accidents is wholly a matter of "chance," the number of accidents sustained by individuals in one period should be altogether independent of the number sustained by them in another period. Examining the records of 411 workers employed in the same location between 1913 and 1924, Newbold, another English investigator, actually found that those involved in 1 or 0 accidents during the first 6 years of employment averaged 0.32 accidents during the second 6 years, whereas employees with 2 or more accidents during the first 6 years averaged 1.06 accidents during the second 6 years of employment.²⁸

Approaching the problem from the same point of view, Marbe, a German psychologist, examined the accident records of officers in the German army who had carried insurance for a period of 10 years. Those with no accidents during the first 5 years of this insurance period averaged 0.52 accidents during the second 5 years. Officers with 1 accident during the first 5-year period averaged 0.91 accidents during the second 5-year period; those with 2 or more accidents during the first 5 years averaged 1.34 accidents during the second 5 years.²⁹

TABLE VIII.—ACCIDENT RATES IN TWO SUCCESSIVE PERIODS
OF 3 YEARS EACH*

<i>Accident Group 1931-33, Accidents Per Driver</i>	<i>Same Group 1933-36 Accidents Per Driver</i>
0	0.101
1	0.199
2	0.300
3	0.484
4	0.700

* From *The Accident-Prone Driver*, House Document No. 462, Part 6, Washington, U. S. Government Printing Office, 1938.

Accident-Proneness in the Operation of Motor Vehicles.—Studies of motor vehicle operators have furnished particularly useful data on accident-proneness. In Connecticut,³⁰ the accident records of a random sampling of 29,531 drivers were investigated for the 6-year period 1931-1936, inclusive. Table VIII shows the accident rate of these drivers during two successive periods of 3 years. It is apparent that those having multiple accidents in the first half of the 6-year period tended to repeat again in the second half, in accordance with the expectations inherent in the hypothesis involving a distribution of unequal liability.

Accident Rate and Accident Proneness.—Of interest in the consideration of accident proneness are differences among employees

in frequency of accidents. Investigations have shown that, in a given period, some employees suffer many more accidents than do others, and that a small percentage of employees is generally responsible for a large percentage of accidents in a plant. So, for example, in the Connecticut sampling, it was found that accident repeaters, who constituted 4 per cent of the total drivers and 20 per cent of those who had accidents, were involved in 36 per cent of all of the accidents during the 6-year period.

Another investigation, covering 1871 accidents reported by a group of companies employing 1294 taxicab drivers, revealed that 20 per cent of the drivers were responsible for about 51 per cent of all the accidents. One-half the men were responsible for about 82 per cent of all the accidents. Approximately 25 per cent had no accidents at all during the period covered by the reports. Since these drivers operate similar equipment under the same conditions, the higher frequency of accidents of accident repeaters cannot, it is claimed, be attributed to chance, but to habits, or attitudes, or psychomotor dispositions that make each man in the group peculiarly susceptible to accidents.³¹ Similar facts and conclusions appear in a study, by the Sub-Committee on Commercial Drivers of the Committee on the Psychology of the Highway, Division of Anthropology and Psychology, National Research Council, covering accident records for the years 1933-35 of 4 companies operating large fleets of motor vehicles and employing some 1400 drivers.³²

In an investigation by Chambers a group of 128 London bus drivers, all with experience in driving heavy vehicles and all well-trained before starting to drive buses on London streets, were followed-up for a period of 5 years.³³ During this period the entire group of 128 drivers had 1052 accidents, representing an average of 8.3 accidents per man for the 5-year period and of 1.6 accidents per man per year. In the total of 1052 accidents, 260 were sustained by 14 of the drivers, each of whom had 15 or more accidents (an average of 18.5 per driver) in the 5-year period.

Analysis of pilot accidents show the same trend. A study of 2625 naval pilots who had 2559 accidents revealed that approximately 18 per cent of the pilots were involved in about 58 per cent of these accidents.³⁴ In a further investigation involving 3000 pilots, it was

found that approximately 18 per cent had a history of repeated "pilot-inaptitude" accidents and that this small group was responsible for 49 per cent of the fatal accidents sustained by the entire group of pilots.³⁵

It seems highly probable, as suggested by Cobb, Mintz and Blum,³⁶ that a high accident rate is in itself not necessarily an index of accident-proneness. Nevertheless, there is need for considering the possibility that accident-repeaters require special analysis and treatment as a means of preventing continued recurrence of accidents.

Discovery and Treatment of Accident-Prone Individuals.

—The question which arises from this discovery that some men are more susceptible to accident than others is how to detect and how to treat the accident-prone individual. There is evidence, in studies by Farmer and Chambers,³⁷ that psychological tests can be used in the detection of accident-prone individuals. One such investigation, involving 1800 subjects employed in diverse occupations, showed that the accident rate of the 25 per cent with the lowest scores on a weighted battery of intelligence and aesthetokinetic tests was about 2.5 times as great as that of the remaining 75 per cent. Further follow-up for periods of from 1.4 to 4 years revealed an increasing relationship between test scores and accident incidence. This suggests that the tests measured an important and relatively stable factor in accident causation whose effect makes itself felt with increased exposure to the conditions of the working situation. This study also showed a relationship between capacity for work and safety in work, in as much as those who made higher scores on the tests proved in general to be the more proficient workers.

While, as suggested on pages 547 f., tests can be used in the detection of accident-proneness prior to employment, even the best of tests will not eliminate all accident-prone individuals.³⁸ Tests commonly in use, which have predictive efficiencies well below that of an ideal test, invariably include a proportion of truly accident-prone individuals among those who are selected for employment even when the major or sole purpose of the test is to predict acci-

dents. Moreover, individuals who are essentially not accident-prone may at some time become involved in a series of accidents as the end-effect of ill health, difficulties in the home or in the plant, the development of bad work habits, and so on. There is evidence that the accident records of such individuals can be improved by *clinical study* designed to determine the causes of accidents in the individual cases, followed by suitable treatment.

The character of the treatment depends upon the diagnosis. It may take the form of systematic instruction to replace faulty habits of operation where these seem to be involved in the accidents. In other instances medical treatment, discipline, encouragement, or supervisory follow-up may be used in rehabilitating the accident-prone employee. Treatment is differential in character. It is based on the recognition that there are many different causes of accidents, that these may be combined in different patterns in different individuals, and that the remedy must be adapted to the cause.

Between January 1, 1929, and January 1, 1930, 154 accident repeaters were studied and treated in an "accident clinic" maintained by The Milwaukee Electric Railway and Light Company.³⁹ These men showed an 81.5 per cent reduction in accidents as compared with a 25 per cent reduction for the system as a whole. The average accident per man in this accident-prone group was reduced from 2.8 to .51, a figure well below the average for the entire system. Moreover, of the men handled in the "accident clinic" only 3 were recommended for discharge. The Cleveland Railway Company reports equally favorable results from its program of accident prevention through individual case study.⁴⁰ An elaborate program of individual study and treatment of accident-prone drivers was undertaken in 1927 by the Boston Elevated Railway Company. As a result of the application of appropriate procedures, the actual net savings in the cost of injuries and damages in 1929 as compared with 1928 amounted to \$300,670.73.⁴¹

Training the Noncommercial Driver for Accident-Prevention.—As has been indicated on pages 548 f., tests recommended for use in licensing private drivers have generally proven to be less satisfactory

than those developed for use in industry. Moreover, whereas industry may be justified in using what are essentially *actuarial* predictions in eliminating from employment a group of men with low test scores, there is serious question as to whether the same viewpoint can be applied in licensing drivers, particularly in view of the knowledge that existing limitations in tests will deprive some individuals who are fully competent to drive of the right to operate their automobiles.⁴² In addition, as suggested above, there is evidence that at least some drivers who, because of repeated accidents, may be considered accident-prone, make safe drivers if they are given special training and other treatment.

Such considerations, and the fact that "non accident-prone" drivers, involved in occasional accidents, contribute so largely to the annual total of accidents, suggest the desirability of focusing less attention upon a testing program and more attention upon other techniques in reducing accidents among operators of private automobiles. Among the most important of these, in the opinion of the author, are adequate training programs which will promote the development of safe driving habits and attitudes conducive to safe operation.

Systematic courses in motor vehicle operation for high school students, of the type developed by Neyhart, of Penn State, represent an advance in this direction, although considerably more research is needed to determine the exact value of this approach.⁴³ Training for new drivers should probably be supplemented by periodic re-examinations, under standard road conditions, of experienced drivers, particularly of accident repeaters, with suitable re-instruction when needed, although here again, as Johnson and Cobb have indicated, much remains to be done in adequately evaluating the effects of such re-education.⁴⁴ A periodic checking of driving habits by each driver, of the type suggested by Toops and Haven, and other procedures will also find a place in a well-rounded program of preventing highway accidents attributable to the human element.

Specific Factors in Accident Causation.—Investigations of accident susceptibility and programs for detecting and treating accident-proneness have been supplemented by studies of the influence of

specific factors upon the incidence of accidents. These show that accidents are more numerous among young and inexperienced workers than among the old, although they tend to be of greater severity among the latter. Training in safe methods of work serves to prevent accidents. Accidents are more frequent in the extremes of heat and cold than at a moderate temperature. The number is increased under unfavorable lighting conditions. The accident rate is adversely affected by fatigue; speed-up of production; by the week-end's cessation from work. Accident frequency does not increase with night work, although the causes of accidents vary with the shift. Accidents may be related to the physical condition of employees, and possibly number more among the industrially inefficient than the efficient.⁴⁵ Attitudes of management and of employees are among the factors that are significant in accident causation.⁴⁶

In the transportation industry the author has investigated the influence of sex upon safety by comparing the accident rate of 2000 male taxicab drivers with that of 40 women taxicab drivers operating under exactly the same conditions, both representing the complete complement employed by two companies in Philadelphia. Over an 11-month period male taxicab drivers were responsible for 0.257 accidents per thousand miles in operation, while women, carefully selected and trained so that they represented a sampling of superior female drivers, were responsible for 0.722 accidents per thousand miles, or approximately three times as many as the men. The same ratio applied to accidents per thousand dollars of revenue.⁴⁷

Designing Machines for Accident Prevention.—Jobs differ with respect to the extent of exposure to accidents which is a function of the job itself. Because of the very nature of the task and machines involved, the job of comptometer operating is less hazardous than is that of driving a streetcar or operating a high-voltage electric switchboard. Much can be done to reduce the "accident liability" of many jobs by considering psychological factors in the design, construction, and installation of machines and tools.

Making Automobiles Safe.—According to Henderson, many of the seemingly inexplicable cases of cars going out of control are due

to the "self-righting reflex."⁴⁸ By the operation of this reflex, the driver responds automatically to any sudden severe disturbance of equilibrium by gripping the wheel to steady himself and forcing his legs forward and his feet down on the accelerator pedal in the typical "extensor thrust." It is suggested that there should be another pedal for the left foot, at the place where it usually rests when not on the clutch, and that heavy pressure on this pedal should either close the throttle or cut off the power. A violent forward thrust of the legs would then slow down the car, instead of causing it to accelerate out of control.

As Dunlap⁴⁹ points out, body designs of cars introduce needless hazards. The driver who fails to keep over to his side of the road may be merely "hoggish," but in many cases it is because he cannot see where his wheels are. Placing windows lower, setting the radiator and hood down, giving greater breadth to the windshield, would help to make driving safer by increasing the range of vision.

Apart from the changes in the car itself, accident liability in the operation of a motor vehicle can be reduced if colors most quickly discernible to all drivers were used in traffic lights. The importance of size, shape, and color of road markers and signs has been emphasized by Toops and Haven. They have also pointed out items in car construction which tend to increase accident liability, such as dash lights which contrast brilliantly with darkness outside of the car; lights which fail to pierce fog; glaring headlights; 6-inch front corner posts which make the automobile "just as potentially dangerous on the road as if all its metal parts were made of pewter instead of the finest tool steel."⁵⁰

Designing Electric Substation Equipment for Safety.—The author has considered this problem from the viewpoint of electric substation operation,⁵¹ particularly in terms of applying to the design of equipment and markers the principles of attention developed from laboratory studies and investigations in the psychology of advertising.

Observations in substations show, for example, that there has been a failure to capitalize upon differences in *form* or *shape* as a way of keeping an operator accurately oriented with respect to equip-

ment under his charge. On most systems it is the practice to identify different electric buses * with markers of the same size and shape, labeled No. 1 Bus and No. 2 Bus, respectively. It is suggested that the danger of confusing buses, with all the hazards attached thereto, could be more easily avoided if markers of different shapes were used in identifying the buses, so that, for example, Bus No. 1 would invariably, in the mind of the operator, be the bus with the square marker, and Bus No. 2 that with the octagonal or perhaps circular marker. With differences in the shapes of markers could also be combined differences in color, so that Bus No. 1 would invariably be thought of as the bus with the red-and-white square marker, and Bus No. 2 as that with the octagonal or circular yellow and black marker.

In the construction of switchboard panels it is common practice to depend solely upon the color of identically shaped indicating lights, generally red and green, to indicate the setup as the operator "sizes up" the situation before proceeding with his work. The effectiveness of the indication, from the viewpoint of attracting and controlling attention, could be considerably improved if a direction clue were added to that of color. If this were done, an illuminated red bar in line with the bus might be chosen as the universal symbol for a closed circuit breaker; an illuminated green bar at right angles to the bus as the symbol for an open circuit breaker, thereby capitalizing upon the principle of *direction* in guiding attention to the operation to be performed.

The principles of *accommodation of attention* and of *motion*; the *square root law of effect*; findings of studies on *color contrast* effects and *legibility* of print are other examples of psychological data which have wide application in designing electric substation equipment so as to decrease the probability of "mental lapses" and the dangers of accidents and errors in its operation.

Increasing Safety in the Air.—In the field of aviation, considerable attention has been given to psychological aspects of plane and equipment design, in part with the specific purpose of increasing

* Main copper conductors.

safety during flight. Underlying such research is the growing conviction that many errors resulting in accidents which have been designated as "pilot error" could more appropriately be described as a "designer's error."⁵²

In operating a plane, for example, an error in reading the altimeter can be the direct cause of an accident in instrument flight during bad weather. In one study, using printed reproductions of various types of altimeters, it was found that 11.7 per cent of altimeter readings by experienced pilots were in error.⁵³ This error was generally in the order of one thousand feet, the altimeter being read at 1900 feet instead of 2900; 4900 feet instead of 5900, etc. The same study shows that redesigning the instrument so as to permit pilots to make a direct reading instead of combining readings from two pointers reduces the errors in reading by experienced pilots to 0.4 per cent.

Other studies by the military services show that errors and accidents grow out of the uniformity of control handles used in entirely different operations.⁵⁴ So, for example, in an airplane the control used in raising and lowering the landing gear is similar and in close proximity to that used in operating the flaps. There are instances in which the pilot has mistakenly operated the flap control when he should have been lowering his landing gear. As a result of experimental studies, control handles are being diversified with distinctive functions assigned to each type of control as a step in adapting equipment to the psychological capacities and limitations of the man who is to use it.

In Summary.—It is apparent that the psychological approach to the study of accidents has already produced a wealth of data of extreme significance in the elimination of this source of waste within and outside of industry. Perhaps more important than the facts and methods is the change in the underlying philosophy of accident prevention—the substitution of the principle of "causation" for the earlier philosophy of "fault"—the replacement of a fatalistic doctrine of "chance" by a constructive policy in accident prevention which focuses attention upon the individual and upon factors operating to involve him in accidents.

FATIGUE IN INDUSTRIAL WORK

Fatigue Indications.—The reduction of unnecessary fatigue represents an important step in maining fitness for work and in promoting the efficiency and the adjustment of the individual worker and the stability of the industrial system. Fatigue is characterized by (1) a decreased capacity for work, known as *work decrement*; (2) *modifications in the physiological state* of the individual; and (3) a *feeling of weariness*.*

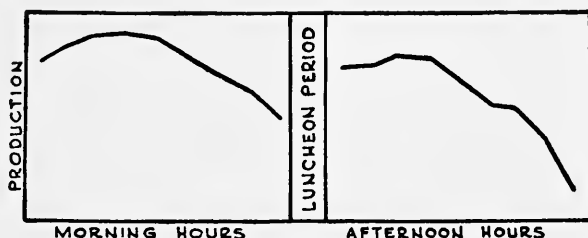


FIG. 26.—DAILY PRODUCTION CURVE.
(After Burt, "Psychology and Industrial Efficiency," by permission of D. Appleton-Century Company, Inc.)

Fatigue and Production.—Decreased production and a lowering of the quality of production represent signs of fatigue in industry. Changes in output ascribed to the onset of fatigue are graphically represented in Fig. 26, which represents a daily production curve showing a sluggish start while the worker is warming-up; a sharp rise as he gets into his stride; a period of high production; followed by a decline in output toward the end of a working spell.

The shape of the production curve varies with the type of work, and also from individual to individual on the same job, but that shown in Fig. 26 is one frequently observed in the case of heavy muscular work.⁵⁵ The objectives in fatigue reduction, in so far as industrial output is concerned, are to raise the general level of production and to eliminate such excessive variations in the process of production within the working spell which may continue to appear in the presence of adequate motivation and other factors conducive to maximum output.

* See pages 457 ff.

Physiological Changes in Fatigue.—Fatigue is marked not only by decreased output but by changes in the physiological balance of the body involving the respiratory system, digestive system, nervous system, endocrine glands, transformations in blood cells and chemistry, body secretions, etc., and other modifications in metabolism.*

The Feeling of Fatigue.—Fatigue is also accompanied by a feeling of weariness which appears with prolonged work.† This is the subjective sign of deep-seated bodily changes and decreased capacity for work which characterize fatigue. The feeling of fatigue may be accompanied by irritability, anxiety, excessive worry, disturbed emotional states of all kinds which lead to disturbances in social relationships both inside and outside of the plant. Unfortunately, laboratory studies of the type early reported by Poffenberger⁵⁶ show that there is no consistent relationship between decrease in output, changes in physiological state, and the feeling of fatigue. Because of this it has been found impracticable in laboratory and industrial experiments to employ the feeling of fatigue as an index of fatigue. However, particularly in English experiments, and to some extent in experiments conducted in U.S.S.R., this factor in industrial adjustment has been assigned its proper weight by the use of introspective reports along with measures of energy expenditure and changes in output in evaluating the fatigue status of the individual worker.

The Psychological versus the Economic Concept of Efficiency.—This emphasis upon the feeling of fatigue and upon physiological factors distinguishes the psychological approach in fatigue reduction from that of the industrial engineer. The latter has been inclined to treat efficiency as a purely economic concept, defined entirely in terms of changes in quantity and quality of output produced by variations in methods or conditions of work. In contrast is the insistence of the psychologist that the term "efficient" should be restricted to that method or condition of work which makes possible maximum production and quality of work at the least physiological cost to the worker and which reduces to the minimum the feeling

* See page 457.

† See pages 457-459.

of fatigue and dissatisfaction experienced by the worker at his task. Viewed in this way one measure of efficiency is the relationship between energy input and output, that is, the proportion of the energy that is usefully expended. Another criterion, as Thorndike has suggested, is the degree of satisfaction derived from the task "measured by the tendency of the individual to relax or abandon the action in question in spite of the fact that the work can be maintained at a constant level of production."⁵⁷

The Elimination of Unnecessary Fatigue.—A certain degree of fatigue is a normal result of activity. Fatigue becomes harmful if carried to the point where *recovery* is not adequate, where recuperation does not take place after a reasonable period of rest. The objective of fatigue study is to eliminate unnecessary fatigue produced by unsatisfactory conditions or methods of work, unsuitability for the job, and so on. This involves a consideration of the influence upon fatigue of (1) the *time element*, (2) the *work element*, (3) the *environmental element*, and (4) the *personal element*.⁵⁸

The Time Element in Fatigue Reduction: *Hours of Work.*—The number of hours spent at work has a definite relationship to fatigue. Industry's initial opposition to reducing hours of work has been largely overcome by the finding that production is not adversely affected and is frequently increased by shortening the working day and the length of the working week. For example, a reduction of hours from 58.2 to 50.6 per week in an English munitions plant was followed by a 39 per cent increase in average hourly output and a 21 per cent increase in average weekly production. Shortening the working week from 66 to 48.6 hours brought a 68 per cent increase in average hourly output and a 15 per cent increase in the average weekly production of women engaged in turning out fuse bodies.

A conclusion from a study of 12 American metal working plants is that, while there is no such thing as an "optimum hour schedule" for all of industry, the available evidence indicates that, on the whole, a 5-day week and 8-hour day are more efficient than a work schedule with longer hours.⁵⁹ This does not mean that longer hours are not productive. There is, for example, little sacrifice of overall efficiency

if a sixth day of 8 hours or less is added. The sharper break occurs when daily hours are raised from $8\frac{1}{2}$ to $9\frac{1}{2}$ or 10 or 11, provided the workers operate under an incentive-wage system. The primary effect of this lengthening of daily hours for workers on the day shift, when the 5-day week is maintained, is to wipe out the midweek spurt. The analysis of daily production patterns in several plants under a 40- or 48-hour schedule shows a building up of hourly efficiencies toward a peak on the third and fourth days of the week, with a slight drop thereafter. When daily hours were lengthened to $9\frac{1}{2}$ or more, however, this peak disappeared. The production curve for the successive days of the week flattened out, and any one day was about as good as any other day. When a sixth day was added, the line of production remained flat, but dropped to a lower level.

The data indicate clearly that workers adjust themselves to longer hours by slowing down, not because they want to, but because they have to. Such findings have contributed to the progressive reduction of hours of work to a point, at least in the United States, where large returns in fatigue reduction are to be sought not primarily in curtailing hours of work, but in improving methods and conditions of work.

Rest-Pauses.—Although, in general, hours of work in American industry are not excessive, the fatigue produced by exertion during these hours can be decreased by the introduction of rest-pauses at periodic intervals. Vernon and Bedford,⁶⁰ of Great Britain, report an average increase of 6.2 per cent in production on 8 varied jobs from the introduction of 7- to 10-minute rest-pauses in the morning spell of work. In a plant manufacturing airplanes and airplane parts, the introduction of suitable rest-pauses by investigators attached to the Obucha Institute of Occupational Diseases, in Moscow, resulted in a 10 per cent increase in output with a pronounced reduction in fatigue as measured by performance on psychological tests.

Equally striking results are reported by the Moscow Institute for the Organization, Hygiene and Economics of Labor. A "complex brigade" of scientists from this Institute, including an engineer, a time-study man, two physiologists, three psychologists, and a physical culture instructor, studied the effect of varied *régimes* (distribu-

tion of work time) upon the production of overshoe inspectors working on conveyer belts. A comparison of 6 *régimes*, differing in the lengths of alternating work and rest-pauses, showed marked variations in terms of effect upon output, quality of work and fatigue, as measured by standard psychological tests and by changes in sensory thresholds.

The selection of the optimum *régime* was followed by well-marked increases in output and ease of work, as measured in terms of the worker's feeling of comfort. This investigation is of interest in illustrating (1) the influence of changes in conditions of work upon fatigue in terms of psychological and physiological effects as well as in terms of production; and (2) a procedure of joint investigation by psychologists, physiologists, and industrial engineers, first employed in Great Britain, which can be beneficially applied in research on problems of industrial fatigue.

Findings from studies on the effect of rest-pauses include the demonstration that (1) the optimum length and location of the rest-pause vary from job to job; (2) the best time for introducing a rest-pause is immediately before the decline in rate of production; (3) the beneficial effects of rest-pauses increase with time, etc. In general these investigations have given support to the conclusion that *recovery* from fatigue is facilitated by rest-pauses, and to the principle that in industry "more output can be achieved by applying oneself steadily for short periods, and then resting, than by applying oneself less steadily and having no rest periods."

The Work Element in Fatigue Reduction.—Inefficient working methods and badly designed machines and tools are responsible for a tremendous waste of human effort at work.

Efficient Methods of Work.—One important step in eliminating such waste is to find the easiest and most economical way of doing the task. This need was early recognized by Frederick W. Taylor, the pioneering spirit in scientific management, who actually employed the practice of isolating and timing the constituent operations of a job in determining the "quickest and best" motions to be used by the worker.

Formal procedures for this purpose were first developed by F. B. and L. M. Gilbreth.⁶¹ These include (1) a classification of movements into 17 fundamental elements, such as search, grasp, assemble, etc., each known as a *therblig*; (2) graphic methods for recording and charting the sequence of movements on a task; and (3) apparatus for photographing and timing motions. The analysis of charts and models prepared through the application of such *time and motion study* techniques leads to elimination of unnecessary movements and the combination of remaining motions into a standard method of work designated as the *one-best-way* of work. In this are combined the best elements observed in the study of different workers performing the same task.

Time and motion study procedures have been widely applied in all types of industry. Through their application Gilbreth succeeded in reducing the number of movements required for laying a brick from 18 to 5 and demonstrated that the number laid per hour could be increased from 120 to 350. In certain jobs in the paper industry production has been increased 100 per cent; in packing cloth, about 150 per cent; in riveting, 69 per cent, in part, by improving methods of work following a time and motion study analysis of each job.

Unfortunately, in most instances it is impossible to determine exactly the extent to which increased production depends upon the improvement of working methods because, in practice, variations in working methods have ordinarily been accompanied by the introduction of new systems of wage payments and other modifications in conditions of work. Moreover, there has generally been a failure to measure the influence of changes in working methods upon the energy consumption and feelings of the workers. For these and other reasons, psychologists, although recognizing the inherent soundness and value of time and motion study analysis, have been hesitant to approve whole-heartedly results obtained through its use in industry.

The "One-Best-Way" of Work.—In particular, serious questions have been raised concerning the concept of "one-best-way" of work. It is pointed out, for example, that the fastest motion, frequently included in the final series, may not be the best from the

viewpoint of fatigue. There is objection to the practice of arriving at a uniform, standard method of work by building-up a composite of the seemingly "best" ways in which various expert workers do separate parts or elements of the job, since these "little best ways" may be far more effective and energy-saving for some workers than for others.⁶² In general, there is evidence of neglect of individual differences in musculature, in leverage, in other aspects of physical, physiological, and mental make-up. The existence of such differences makes it highly questionable whether one set of movements, however good they may be, can be regarded as the best movements for every worker.

The Characteristics of Good Work Movements.—Such criticism does not represent a denial of the importance of discovering easy and economical methods of work. However, reasonable rather than too rigid requirements as to the best methods of work seem desirable. Principles for evaluating work movements and for selecting methods which will reduce fatigue and promote satisfaction while increasing output have been outlined by Myers,⁶³ founder of the National Institute of Industrial Psychology of Great Britain, as follows :

(1) Successive movements should be so related that one movement passes easily into that which follows, each ending in a position favorable for the beginning of the next movement.

(2) The order of movements should be so arranged that little direct attention is needed for passage from one to another.

(3) The sequence of movements should be so framed that an easy rhythm can be established in the automatic performance of the various elements of the operation.

(4) Continuous movements are preferable to angular movements which involve sudden changes in the direction of movement.

(5) The number of movements should be reduced as far as possible within the scope of limitations suggested above.

(6) Simultaneous use of both hands should be encouraged.

(7) When a forcible stroke is required, the direction of movement and placement of material should be so arranged that, so far as practicable, the stroke is delivered when the movement has reached its greatest momentum.

The application of such principles, or of similar rules of "motion economy" such as those formulated more recently by Barnes,⁶⁴ should result in a series of standard operations to be used in training workers and to which, in general, each worker should be required to conform. This does not imply that industry should expect absolute slavish and drill-like similarity of movements on the part of the workers. Individual modifications which creep in after initial training, so long as they do not affect quality or quantity of production or safety of work, must be allowed. However, where modification results in a reduction of output or quality of work, in increased fatigue or increased danger of accidents, steps must be taken to retrain the worker to the use of the standard method of work which, if properly formulated, represents a powerful safeguard of both individual welfare and industrial efficiency.

Posture and Distribution of Load.—The posture adopted during work, the weight of the load carried, and the distribution of load are important factors in inducing fatigue. Bedale, of the Industrial Health Research Board, has demonstrated that energy cost per unit of work remains lowest when there is least departure from normal, erect posture in handling loads. From studies by Cathcart and others the conclusion has been reached that loads carried should not exceed 40 per cent of the body weight of the worker for continuous work or be greater than 50 per cent for intermittent carrying. Experiments with various ways of loading and wheeling barrows showed that less energy is used, as measured by oxygen consumption, when barrows are properly loaded and are wheeled at a normal, brisk, walking pace without extra stops.⁶⁵

Design and Speed of Machines.—The avoidance of unnecessary fatigue calls for a study of machine design as a basis for eliminating unnecessary movements and awkward postures. Studies of typewriters,⁶⁶ of laundry machines, leather working machines, boring machines, ironing machines and other industrial equipment have led to changes in the interest of ease and economy of effort at work.⁶⁷

Speed and rhythm are important considerations in fatigue elimination. There is evidence, for example, that work with machines and

moving belts is facilitated by the regular and rhythmic character of activity as contrasted with the irregular and sporadic nature of movement of manual work when the tempo is under the control of the worker. However, for every type of work and also for the individual worker there is an optimum speed or rhythm which makes it possible to gain maximum production with the least expenditure of energy and with improved feelings of ease, comfort, and satisfaction.

These conclusions are supported by the findings of an English plant and laboratory investigation of machine-feeding processes.⁶⁸ These show that efficiency and satisfaction in machine feeding are largely dependent on the relation between the speed of the machine and the capacity of the operator. If the former exceeds the latter, the result is an irregular rate of working conducive to strain and fatigue. In such cases a reduction in the speed of the machine brings increased output and pleasure in work. If the speed is much below the capacity of the worker, the conditions are distasteful and conducive to boredom. If the speed of the machine is adjusted to the average capacity of a selected group of workers, it is too fast for some and too slow for others, so that output and comfort may be increased by adjusting the speed of each machine to the capacity of the individual concerned. A closer adjustment may be effected by the installation of a variable speed device which makes it possible to adapt the speed to the changing capacity of the worker during the day.

Psychology and Engineering in Machine Design.—In spite of the developments discussed above, psychologists have, in the past, largely thought of their function as that of adapting man to the machine, that is, of using psychological techniques in selecting competent personnel, in training them, and in choosing the optimum conditions for using already existing equipment and tools.⁶⁹ More recently, as suggested in the discussion of accidents on pages 583 f., increasing attention has been given to the need of adapting the machine to men—of designing machines to fit human capabilities. As Fitts points out, improvements in operator efficiency which can be obtained from minor design changes often turn out to be greater than improvements which can be effected through careful screening of operators or through long periods of intensive training.⁷⁰ Research

during World War II, involving an application of "engineering psychology" to the design of military equipment, produced important results in the way of equipment which could be operated both more accurately and with greater ease. Mechanical monstrosities have been produced for industrial use by the disregard, in machine design, of basic patterns of perception, of basic patterns of motor coordination, and of human limitations in the integration of complex responses.⁷¹ There are widespread opportunities for the elimination of unnecessary fatigue, as well as for the reduction of accidents, in closer cooperation between psychologist and engineers in machine and tool design.

The Environmental Element in Fatigue Elimination.—

The conditions under which work is done, including illumination, ventilation, plant layout, and so on, are important factors in fatigue.

Illumination.—Production can be increased and fatigue reduced by providing adequate illumination and eliminating glare, shadow effects, and so on.⁷² In an early investigation, by Hess and Harrison, differences in output of roller-bearing inspectors were found to vary directly with changes in illumination, increasing to 12.5 per cent above the base with an increase of illumination from 5 to 20-foot candles. A study by the Industrial Health Research Board showed that only when the intensity of artificial illumination approached 24 foot-candles did the efficiency of typesetting, as judged by the number of errors, turned letters, and total output, approximate the efficiency in good daylight lighting. When illumination was only 2 foot-candles, one quarter of the possible output was lost, the mistakes more than doubled, and the fatigue experienced by the compositor materially increased.

Working under faulty illumination frequently results in eyestrain which may be accompanied by reflex disturbances in other organs. Proper illumination—including adequate intensity, freedom from glare, etc.—contribute to comfort and efficiency.⁷³ Much can be accomplished in promoting easy at work by experimentally setting sound standards and conditions for artificial lighting appropriate to the diverse tasks performed in business and industry.

Ventilation.—Atmospheric conditions influence the production and well-being of workers. In the plant of the Eastman Kodak Company an improvement in ventilating workrooms was followed by a 4 per cent increase in output and a 50 per cent reduction in illness. Studies by the Philadelphia Electric Company show that the introduction of air conditioning into offices was followed by a 45 per cent reduction in loss of time because of illness among employees. The following are typical findings from studies by the Industrial Health Research Board on the effects of atmospheric conditions.⁷⁴

(1) Using involuntary rest-pauses as measures of fatigue, it was found that miners usually rested about 7 minutes per hour under good conditions. In hot damp air and little air movement they took off 22 minutes per hour, and their rate of production fell off 41 per cent.

(2) In weaving, high temperatures and humidity cause fewer breakages of threads but more fatigue to workers. Raising the air-movement velocity to 147 feet per minute increased the comfort and efficiency of workers without adversely affecting breakages.

(3) Older men (50 or more) are more affected by heat than younger men (30 to 39).

Noise.—Laboratory experiments by Morgan,⁷⁵ Laird,⁷⁶ Freeman⁷⁷ and others show that work in noisy surroundings is actually costlier, in terms of energy consumption, than work under quiet conditions. In Laird's experiment introspective observations indicate the presence of a feeling of annoyance during noisy conditions of work.

English experiments show that, in a weaving shed, production was increased 3 per cent and personal efficiency $7\frac{1}{2}$ per cent through the use of "ear defenders" which reduced noise intensity by about 50 per cent and simultaneously increased the feeling of well-being.⁷⁸

The Aetna Life Insurance Company installed sound absorbing materials in an office occupied by typists, clerical workers, punch-card, and comptometer operators. Bonus figures were available reflecting the efficiency of employees during the year preceding the

installation of sound-conditioning. Records of 15 clerks showed an average increase of 9.2 per cent in bonus, calculated at semimonthly intervals for a year prior to and a year after acoustical treatment to produce a quieter condition. At no time during the "quiet year" did the bonus go below the level of the preceding year. The findings were subjected to control in a third year by covering the sound absorbing material with gypsum board. Efficiency figures immediately dropped to a value intermediate between those of the two previous years, but within 2 months the bonus was equal to the level of the "quiet" year. However, at the time the bonus reached a high level in the presence of greater noise there was a reduction in work and only the more efficient employees were retained from there on. Machine break down and other factors prevented a clean-cut interpretation of results among the punchcard and comptometer operators.⁷⁹

The problems of adaptation to noise, of differential effects upon feelings, output, and physiological cost generally complicate the interpretation of findings from studies on the influence of noise upon efficiency at work. Nevertheless, as Berrien suggests, available evidence tends generally to show that noise detracts from efficiency and well-being, although the detailed circumstances under which noise is deleterious and the extent of individual differences in susceptibility to adverse effects are questions for further fruitful research.⁸⁰

Music.—There has been an increasing tendency for industry to play music during working hours, in part with the objective of increasing output. The pattern of results from experimental studies is generally consistent in showing an effect favorable to production and quality of output on repetitive manual tasks in manufacturing plants. This is particularly evident in work not paid on an incentive basis,⁸¹ and in the case of employees with low production records.⁸² The general significance of these findings is clouded, from the viewpoint of fatigue, by the failure of investigators to measure comparative energy costs for work done with and without music. In general, as indicated on pages 603 f., music apparently operates to counteract the adverse effects on output of the "feeling of boredom" characterizing repetitive tasks.

The Personal Element in Fatigue Reduction.—The clothing worn by the worker, his diet, habits of sleep, and home conditions help to determine how quickly the worker will tire on the job. Proper shoes for meter readers, policemen, and others who do considerable walking on the job have been helpful in making work easier. Workmen whose physical condition is impaired by poor health may be more susceptible to fatigue than are healthy individuals. The cooperation of the physician and physiologist is required in eliminating such sources of unnecessary fatigue and, in particular, in selecting men who are physically fit for the job.

Of particular interest to the psychologist, in so far as the personal element in fatigue reduction is concerned, is the relation between suitability for the job and fatiguability. There is some evidence that there is such a relationship, that the more competent workers resist fatigue more easily than do those who are essentially unqualified for the work. However, difficulties in isolating the variable of fatigue from other factors which influence total production, and in developing adequate tests of fatiguability, have retarded the accumulation of unequivocal data to be used in reaching conclusions with respect to the actual relation between "suitability" and "fatiguability."

BOREDOM AT WORK

Closely allied to the feeling of fatigue is the feeling of boredom, or *monotony*, which appears to be associated with repetitive work in industry. Restlessness, yawning, loss of interest, growing difficulty in keeping at the task, an increase in the effort required to maintain efficiency are some of the many overt symptoms of monotony. Less evident on the surface, but repeatedly demonstrated in both laboratory and industrial investigations, is the inclination toward the overestimation of time intervals.

The Monotony Curve.—Another important symptom of monotony is the nature of the progress of work during the day as reflected in the daily working curve. One feature of monotony in work is the tendency for production to *fall* instead of to rise during the middle of the working spell.⁸³ Apparently, as Myers⁸⁴ has

explained, the worker comes to his work feeling ready to go ahead with it, slows up in the middle of the spell as he becomes bored with the work, and speeds up at the end of the day in anticipation of its end. He thus produces a curve inverse in shape to that of the usual production curve.* Associated with this change in the curve is the marked irregularity in production from period to period. Boredom causes a more variable rate of working, characterized by repeated fluctuations in the time taken to complete consecutive units of output.

These characteristics of production in monotonous work are well illustrated in Fig. 27, showing the production of girls engaged in the manufacture of electric lamps, whose feelings of boredom were noted introspectively. The curves representing the average rate of work during 5-minute periods of a composite day are shown by the broken lines whereas the general tendency is represented by the heavy black lines.

Individual Differences in Susceptibility to Monotony.—

Investigations show that all individuals are not equally susceptible to the feeling of boredom. For example, a study by Wyatt and Langdon⁸⁵ shows that of 355 experienced unmarried female workers employed on simple types of repetitive work who were assessed for boredom, 3 per cent were *hardly affected*, 33 per cent were *slightly affected*, 38 per cent *experienced a moderate degree*, 23 per cent *suffered severely*, and 3 per cent were *seldom free* from boredom. Here, as in earlier studies, wide individual differences in susceptibility appear. Moreover, workers for whom the feeling of boredom represents a serious problem are in the distinct minority.

Monotony and General Intelligence.—Experiments have suggested that differences in susceptibility to monotony are associated with differences in general intelligence. Wyatt, Fraser, and Stock⁸⁶ gave intelligence tests to operators engaged in winding and inserting filaments in electric lamps, in soap wrapping, in chocolate packing, and in tobacco weighing. Output curves obtained from

* See page 587.

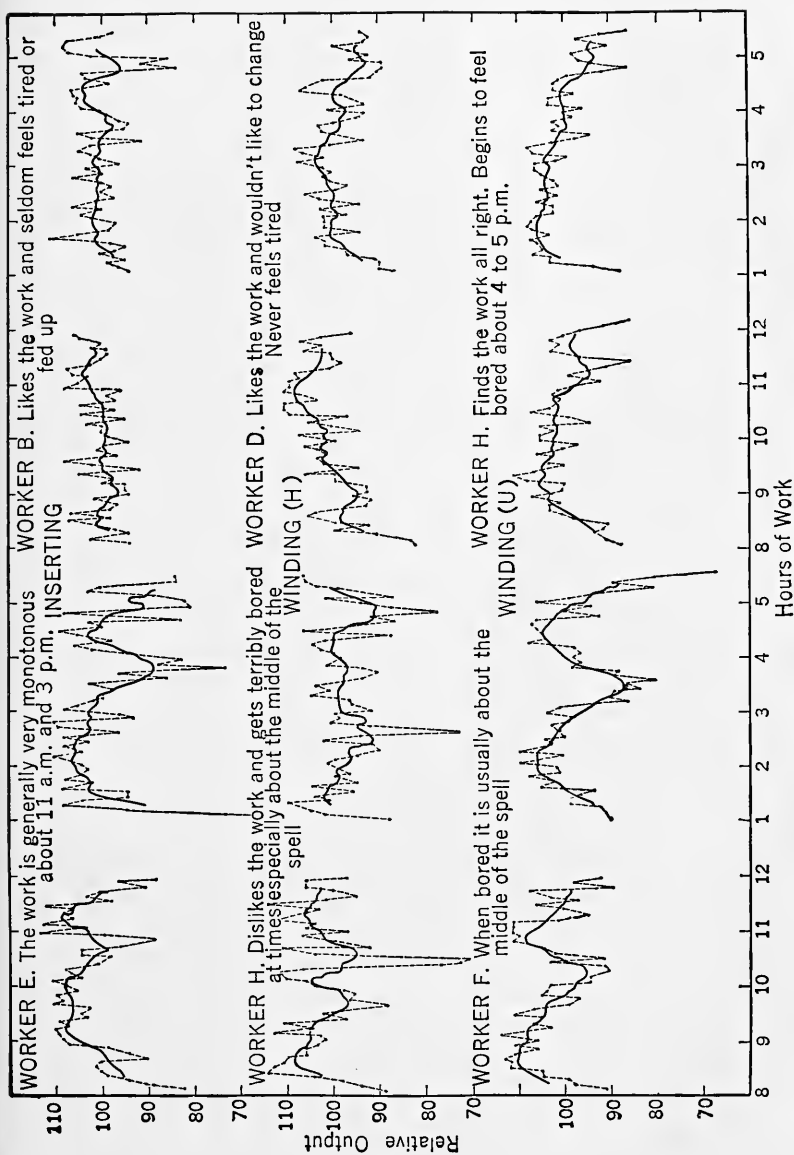


FIG. 27. Output curves obtained when boredom was experienced (left half) and almost absent (right half) in different industrial processes. (From Wyatt, Fraser, and Stock, "Effects of Monotony in Work," London: Ind. Fat. Res. Bd. Report No. 56, 1929, by permission of Controller of His Britannic Majesty's Stationery Office.)

the workers of inferior intelligence proved to be steadier and less affected by the midspell depression than those of the more intelligent operatives. Introspective reports indicated that, on the whole, workers of inferior intelligence appeared to like the repetitive processes and seldom suffered from boredom, while those of superior intelligence seemed to be industrial misfits and would have been better employed on less repetitive jobs.

Other Influences in Monotonous Work.—There is evidence that whether or not an individual will experience boredom depends, in part, on traits other than intelligence. That temperament plays an important role is suggested in laboratory studies by Thompson,⁸⁷ Wunderlich,⁸⁸ Winkler,⁸⁹ and in the investigation by Wyatt and Langdon.⁹⁰ Inability to mechanize simple motor tasks; having the mind free for “daydreaming”; a desire for creative rather than routine work, also influence the worker’s reaction to a repetitive task.

Such findings indicate the importance, in avoiding maladjustment, of fitting to highly repetitive tasks those individuals who are by disposition and temperament especially adapted to it. As Wyatt and Langdon point out, “in selecting operatives for repetitive work relative immunity from influences which prevent the worker from making full use of potential ability should be taken into account,” especially since it has been found that “(a) boredom lowers the rate of work; (b) workers of inferior ability tend to work more closely to their maximum than those of superior capacity; and (c) the rate of work when learning an industrial process is reduced by boredom.”⁹¹

The Effect of Uniformity and Variety in Work upon Monotony.—Uniformity in work seems to be one of the constants in the monotony-producing situation. The insistence upon uniformity, upon specialization, is based upon the belief that keeping the worker at one task favors production, whereas variation of any kind from task to task interferes with industrial efficiency. This belief has been investigated in a number of laboratory and plant studies.

In one of these, Wyatt and Fraser⁹² examined the effect of variety as compared with uniformity of work in soap wrapping, tobacco weighing, handkerchief folding, and other repetitive tasks. The results of the investigation indicate that, in many instances, complete uniformity in manual repetitive work may be less productive and lead to greater irregularity in the rate of working than a reasonable degree of variety. The latter is also preferred by the workers. The effect seems to depend partly on the nature of the process and partly on the individual operative. Furthermore, while frequent changes are definitely detrimental to production, there is some evidence that from the point of view of production and of satisfaction the best results are attained when the form of activity is changed after 1½ hours of unvaried work.

Other Antidotes to Repetitive Work.—Another method of overcoming adverse effects of monotony is suggested by the finding that piece-rate systems of payment seem less conducive to the feeling of boredom than the time-rate systems. The possibility of greater earnings, the competitive feature, seems to induce interest, to set up a goal which counterbalances the effect of boredom or perhaps compensates for the “set” or attitude toward monotony on the part of the worker. Rest-pauses properly spaced do much toward changing the shape of the production curve in a repetitive job and toward decreasing the expressed discontent. Short pauses for conversation and the development of group morale are other devices for overcoming boredom at work.

Music and Monotony.—Studies by Wyatt and Langdon led to the conclusion that music, played at intervals during the working day, is an effective antidote to boredom.⁹³ Kerr has analyzed the results of earlier studies on the effect of music and also reports results of his experiments involving repetitive manual tasks performed in plants manufacturing naval capacitors, quartz crystals and radio tubes. Findings in these experiments showed consistently higher production and net good yield on music than on no-music and music-less days, although the effect was variable in the case of quality of production. The differences, however, were generally small

and without statistical significance, although it is stated that the critical ratios may be spuriously low because of failure to correct low production trends. From a cumulation of evidence from earlier research and his own studies, the conclusion is drawn that music favorably influences employee efficiency on repetitive tasks, particularly in departments not having wage-incentive systems, and that this occurs, in part, because music breaks the monotony of the work spell.⁹⁴

In a more recent study by Smith,⁹⁵ involving an average of 21 employees on each of 2 shifts, production over a 12-week period on highly repetitive operations on a rubber-sealed terminal production line was found to be higher on music than on no-music days. The difference proved to be statistically significant when output data were corrected for production trends. The effect of music was more marked on night shift (average production increase of 17 per cent) than on the day shift (average production increase of 7 per cent). Production increases varied with the hour at which music was played and was greatest during hours of low productions. The more an employee wanted music, the more music tended to increase his production; the lower the employee's production, the more music tended to increase his production. From these findings, and a study of employee attitudes, the conclusion is drawn that music will both improve production and awaken favorable employee attitudes on simple, repetitive jobs. Music, it is suggested, counteracts adverse effects of monotony on production in situations where the worker's capacity for attention is not absorbed by his work because, in this circumstance, music appears to divert unused attention from brooding, talking, or off-the-job activities.

General Aspects of Monotony.—There has been much general discussion of the effect of repetitive work upon the well-being of the worker and the stability of our industrial civilization. An illustration of one point of view in the discussion of this subject is Marot's⁹⁶ insistence that the assignment of highly specialized repetitive tasks to individual workers induces a thwarting of the creative impulse and a resulting disturbance in the adjustment of the individual worker.

To the boring effect of monotony, to the thwarting of the creative impulse in the ceaseless and meaningless turning of the same screw day after day, she ascribes the strife and disgruntlement which display themselves in periodic conflicts in American industry today.

Such generalizations, when examined, appear to grow more out of the free play of poetic imagination than from the controlled and scientific study of the problem. Complaints from bored workers, it is true, appear to be more frequent than those from the less bored. That boredom seems to increase sensitivity to certain features of the environment and is therefore of importance in relation to dissatisfaction and unrest is one of the conclusions drawn by Wyatt and Langdon as the result of their exhaustive experiment.⁹⁷ However, an examination of the many studies in this field shows clearly that much of the blame leveled against repetitive work is wrongly directed. They indicate, for example, that machine work, repetitive work at an imposed speed and rhythm, are not invariably accompanied by an overwhelming and depressing feeling of monotony.

There seems to be no universal, deep-seated conflict with an instinct of workmanship. As a matter of fact, there are many who prefer routine work, who like automatized tasks which leave the mind free for more pleasurable activities. There are others, apparently a smaller number, who rebel against uniform, specialized work, but even in their case, adaptation is not so difficult as is suggested by the protagonists of the "creative" instinct and by critics of the "machine age."

MOTIVES IN INDUSTRY

It is apparent that the efficiency of workers in industry is influenced by "physical conditions" such as temperature, lighting, ventilation, construction and speed of machinery and also by the patterns of the work itself. However, there is considerable evidence that efficiency is also drastically affected by what can be called "psychological" or "social" conditions of work.⁹⁸ The most favorable "physical" conditions may have little effect in the face of unfavorable employee attitude toward a company or of an organization among employees, formal or informal, resistant to cooperation in achieving

maximum output. As a result, there is growing concern on the part of industrial psychologists with the sentiments, feelings and attitudes of workers, supervisors, and managers and with the interplay of people in the social organization of the industrial enterprise.⁹⁹ In part, this is directed toward a better understanding of the factors and devices commonly employed to stimulate the *will-to-work*.

Capacity-to-Work versus Will-to-Work.—Efficiency in industry is determined to a large degree by the willingness of the worker to use the capacity at his disposal. From a consideration of what is happening in the way of restriction of output among organized and unorganized workers, Strong has reached the conclusion that “few, if any, employees are working up to their capacity. Instead of output representing capacity, it represents what employees believe to be sufficient to hold their jobs, to guard against future wage cuts, to be looked upon with favor by their associates.”¹⁰⁰

Financial Incentives.—The practical problem in industry is to develop devices for stimulating inclination to work. Wage incentives are generally employed for this purpose, on the theory that earnings are of tremendous and immediate interest to the worker. From surveys made by the National Industrial Conference Board¹⁰¹ and other organizations, there is reason to believe that more than 50 per cent of wage earners in the United States are paid under some form of wage-incentive plan including bonuses, premiums, straight piece rates, multiple time and piece rates, and diverse other systems.

Experimental Evaluation of Wage Incentives.—Although great effort and enormous sums have been devoted to devising, installing, and administering various wage incentive plans,^{101a} little has been done to determine how well they work. Such evaluation is made difficult because, in practice, the introduction of a new wage plan is generally accompanied by modifications in method and conditions of work. Moreover, there is evidence that any change, whether it be in schedule of hours, conditions of work, wage plan, etc., may affect production by directing the active attention of the worker to the task.¹⁰²

For these and other reasons there are few unequivocal facts on the general value of financial incentives and on the merit of particular plans.

Typical of data obtained under relatively controlled conditions are those reported by Wyatt, Frost, and Stock,¹⁰³ from a comparison of the effects of *time rate*, *bonus systems*, and *piece rates* on the output and feelings of workers engaged in the repetitive tasks of wrapping, packing, weighing, etc. The substitution of a bonus rate for time rate increased output 46 per cent. A further increase of 30 per cent in production was obtained when a bonus system was replaced by a piece rate. Moreover, the piece rate and bonus systems were not only more productive than a time rate (in the order stated) but results showed in general that (1) workers preferred both the latter to the time rate and that (2) the higher output obtained by the payment by results system could in no sense be said to have been obtained at the expense of the workers' well-being or happiness.

Nonfinancial Incentives.—Such findings, and more particularly day-to-day observations in industry, show that incentive wage-payment plans, properly devised and administered, are of great importance in furthering achievement at work. However, there is also growing realization that an incentive "wage-payment plan, in itself, is but one factor and possibly a minor one¹⁰⁴ in motivating workers and that increasing reliance must be placed upon so-called *nonfinancial incentives* in promoting the full use of workers' co-operation. Wyatt, Frost, and Stock, for example, in the study cited above, conclude that "there can be no doubt that payment systems are of the greatest importance in stimulating the 'will-to-work,' but they are not, in themselves, sufficient to produce it. If an operation is regarded as totally aimless and futile, the strongest monetary incentive may have no effect."

The basis for this conclusion is illustrated in Fig. 28, showing the relative output in successive weeks in different processes under 3 systems of wage payment. The order of popularity of different operations, as developed from controlled interviews with workers, was *wrapping*—1; *packing*—2; *weighing and wrapping*—3; *weigh-*

ing—4; unwrapping—5. It can be seen that the effect of the wage incentive plan is most marked in the operations which arouse the more favorable feeling tones and is completely absent in the least popular processes. In the most popular operations, wrapping, the rate of output was almost trebled by the end of the experiment, while production on the least popular operations, which involved very similar movements, but which appeared to be futile to the workers, showed no improvement.

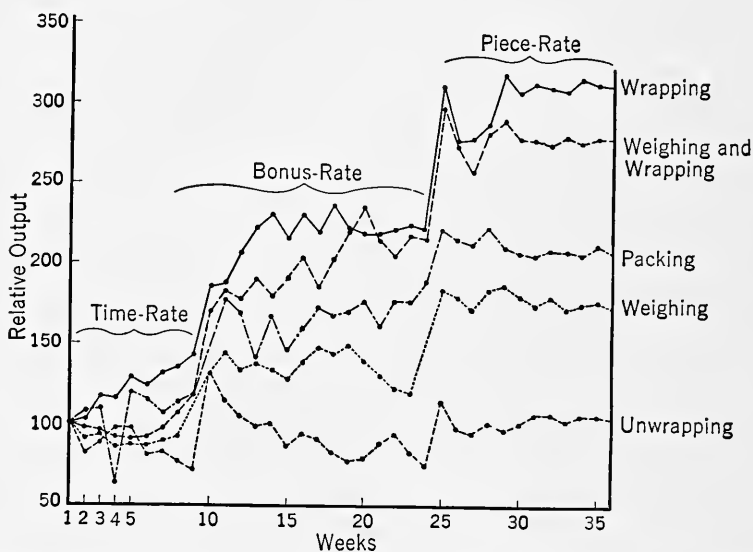


FIG. 28.—RELATIVE OUTPUT IN SUCCESSIVE WEEKS IN DIFFERENT PROCESSES UNDER THE INFLUENCE OF VARIOUS WAGE-PAYMENT PLANS.

(After Wyatt, Frost, and Stock, "Incentives in Repetitive Work." London: Ind. Health Res. Bd. Report No. 69, 1934, by permission of Controller of His Britannic Majesty's Stationery Office.)

Restrictive Practices and "Intent."—The limitations of financial incentives are also indicated in industrial surveys¹⁰⁵ which show a tremendous amount of voluntary restriction of output by both organized and unorganized workers. One conclusion from a recent poll of workers' opinions is that "*The worker isn't sure that employees should work as hard as they can and he is sometimes suspicious of management's motives in raising output.*"¹⁰⁶ Restrictive practices, as well as other difficulties with wage plans, are the outcome

of the failure of wage incentive plans to promote *intent* favorable to production.* "The worker who has no desire to perform a given industrial operation for its own sake is induced to do so by an arrangement of conditions which enables him to see that the performance of the task procures for him something which he does actually desire. . . . The desire for the reward engenders a more *specific intention* to perform the industrial operation, and it is only in so far as this is so that the incentive is effective." ¹⁰⁷

As Fryer and Hiester ¹⁰⁸ point out, this "intent is developed in the conscious evaluation of industrial incentives in relation to individual purpose, which is the result of family, economic, and social problems, ideals, and aspirations." If, as a result of such evaluation, the worker develops suspicions of the sincerity of management in establishing a wage incentive plan, or of its ability to maintain rates, or reaches opinions otherwise unfavorable to the plant and its management, *intent* favorable to production under the wage plan may not result. As a matter of fact, where conditions of work, supervision, and general personnel policies or practices are questioned by the worker, the introduction of a new wage incentive plan may release energies in a direction unfavorable to performance on the tasks leading ultimately, in some instances, to misunderstanding and strife between management and employees.

GROUP DYNAMICS IN INDUSTRY

Social Motives in Work.—Such considerations have led many to question the emphasis upon financial incentives by industrial engineers who have been so largely responsible for the development of elaborate systems of wage payment. Whitehead, of Harvard University, has gone so far as to insist that the basic psychological generalization of economics, as applied in industry, "has exhausted much of its usefulness at the present time" and "has become a positive danger to our social and economic structure. . . . By postulating men and women as actuated in their economic activities solely by a desire for personal gain," he writes, "attention has been so far diverted from a due consideration of the *social* motives involved that these are being systematically thwarted in our present economic civilization.

* See pages 606-07.

. . . We need," he adds, "to develop an organic conception of society in which economic activities take their place as one important aspect of the whole social process." ¹⁰⁹

The Hawthorne Study.—Whitehead's conclusions follow, in the main, from an evaluation of an extensive investigation, initiated by Mayo, at the Hawthorne plant of the Western Electric Company, of 5 young women engaged in independent but similar tasks of relay assembly. Started in 1927, the study represents 12 years of work, including 5 years of continuous and controlled observation of the effect of changes in number and distribution of hours of work, rest-pauses, wage-payment plans, etc., introduced into 23 experimental periods of unequal length. The remaining time was largely devoted to an exhaustive analysis and interpretation of the data.¹¹⁰

The changes in working conditions noted above produced beneficial effects upon production, but there also appeared a general upward trend in production which did not disappear when the favorable conditions were eliminated. So, for example, an "unexpected and continued" upward trend of productivity was found even in a period when workers were put on a full 48-hour week with no rest-pauses and no lunch. Such effects have been ascribed by the investigators to a change in the social situation occurring in the experimental work room. The conditions of the experiment created relationships of confidence among employees, and between the employees and the supervisors, which did not exist in the ordinary work situation in the plant. The working environment and social relations became freer, happier, and more pleasant and employees did their best, not primarily because of wage incentives, reduced fatigue, or similar factors, but because the social situation was conducive to maximum cooperation by the group in carrying on the work of the unit.

As indicated above the major conclusion from this exhaustive study was that the true motivating factor in industrial production was the social situation. Modifications of physical conditions, it is claimed, are effective only when the social situation is appreciably altered. Factors which cause the rate of output to vary include lead-

ership, "unconscious" rivalry, imitation, and financial incentives. However, financial incentives are responded to only in so far as they minister to the individual's own social situation. When financial incentives are opposed to the trend of the stable social organization characterizing a group of workers, they lose their power to motivate. The influence of one worker, or the group, on another worker was found to take various forms and to take place in different time spans.

Other Influences in Motivating Workers.—There seems much justification, from the consideration of experiments in other fields, for Whitehead's insistence upon the force of the social situation in creating intent to work. Moreover, the study made an important contribution in clearly indicating the significance of informal organization, as contrasted with more readily recognized type of formal organization represented by the labor unions. The findings do not, however, justify the conclusion, suggested in the analysis of the Hawthorne Study by the National Research Council Committee on Work in Industry, that physical conditions adversely affecting the efficiency of workers are not frequently encountered in ordinary work in industry¹¹¹ or the opinion that further investigations on the effects of such conditions are of little value in comparison with studies of the influence of employee attitudes and of the social situation.

It is also clear, from other studies, that specific factors have a much more direct influence upon the will-to-work than is suggested in Whitehead's interpretation of the Hawthorne data. These include prestige, recreational facilities, recognition of worth,¹¹² identification with the work process, and others. The influence of such specific nonfinancial incentives is well illustrated in a study reported by Feldman,¹¹³ showing the effect in changes of supervision upon production. Among the employees of an insurance company were approximately 1000 clerks, divided into 22 sections. In 1933, a new wage plan providing group incentives for the 22 sections was inaugurated. Costs for each section for the previous 12 months were computed and each was allowed a group bonus on the savings it

could effect over the cost for that period. All members of a section, including the supervisor, shared in these savings monthly on the basis of salaries, no change being made either in the basic salary or in established policies with respect to salary increases. At the end of 1933 every section showed some improvement, but the extent of improvement for the sections ranged from 2 per cent to 12 per cent, with an average of 8 per cent.

In 1934, management effected a general shift of all section heads, with the general aim of putting those who had been in charge of above-the-average bonus groups into those less-than-the-average sections. One objective in this was to determine whether differences in results were related primarily to differences in supervision or to differences in personnel or conditions of work. An analysis of production at the beginning of 1935 showed increases in production in all sections, ranging from 6 per cent to 18 per cent. The order-of-merit of supervisors remained practically the same as in the study made at the end of 1933. In spite of the reassignment to new sections, those whose units stood high at the end of the first year were at the top of the list during the second year and vice versa. Changes in relative order were limited to 3 cases of supervisors who had moved a step or two.

Early in 1935, the management again shifted, by lot, 20 of the 22 supervisors. Although they were reassigned by chance, the listing at the end of the year showed the surprising result that, in progress made, the same general order of supervisors again prevailed. Moreover, an analysis of errors in terms of 1935 and 1936 earning records showed perfect correlation between the standing of the accuracy record of the work of each section under a supervisor and the standing on the earning record.

The Measurement of Employee Attitudes.—The determination of the best kind of nonfinancial incentives as well as of the value of financial incentives as such involves a study of employee attitudes toward incentives. If management can determine the true nature, extent, and cause of dissatisfaction with particular

incentives, construction corrections can be made which will increase the value of these devices for stimulating the will-to-work.

Such studies are needed, not only to determine attitudes toward financial and other incentives, but also to find out how particular policies and practices are affecting the personnel relations of the plant and through it the stability of the industry and of our industrial civilization. As Uhrbrock points out, "if carefully planned studies of employees' attitudes are made from time to time, employers should be able to gauge their progress in eliminating points of irritation in the work situation. By means of the attitude measurement technique workers may safely express their opinions about working conditions, pay, and hours. Employers, on the other hand, may keep themselves informed of changes in workers' attitudes and modify company practices so as to insure mutual harmony and good will."¹¹⁴ Moreover, as has been suggested by Kornhauser, attitude surveys also operate to relieve tension by letting workers unburden themselves, to improve morale by showing that management is really interested in people on the job, and to give management valuable concrete case material for use in instructing supervisors.¹¹⁵

The usual methods for the assessment of opinion are being used in such surveys. Interviews have been employed, as in the case of the Hawthorne Study, where preliminary studies involving employee interviewing have led to an extended program of "employee counseling" designed to promote the personal adjustment of the individual employee by encouraging free expressions of feeling in a friendly, confidential and nonjudgmental atmosphere.¹¹⁶ However, more frequently, by reasons of relative simplicity, objectivity, and economy, use is being made of attitude scales and questionnaires of various types.

An Illustration of Employee-Attitude Measurement in One Plant.
—Bergen,¹¹⁷ for example, reports on the use of a questionnaire involving a combination of an "attitude scale" with questions of the multiple-choice type employed in measuring the "morale" and reactions to particular policies of 1000 employees from selected office and factory departments of a manufacturing company. Typi-

cal items from such a scale and the value assigned to each are presented in Table IX.

TABLE IX.—REPRESENTATIVE ITEMS FROM AN ATTITUDE SCALE FOR MEASURING EMPLOYEE ATTITUDES*

<i>Attitude Statement</i>	<i>Scale Value (Factor 10)</i>
I am made to feel that I am really a part of this organization	9.72
I can feel reasonably sure of holding my job as long as I do good work	8.33
On the whole, the company treats us about as well as we deserve	6.60
I have never understood just what the company's personnel policy is	4.06
In my job, I don't get any chance to use my experience...	3.18
A large number of the employees would leave here if they could get as good jobs elsewhere.....	1.67
I think the company's policy is to pay employees just as little as it can get away with.....	0.80

* (From Industrial Conference Board Management Record, April, 1939.) The range of values in the attitude scale, while statistically reliable, must be recognized as arbitrary. For the purpose of interpreting results, therefore, it will help to multiply each scale value by 10 and to think of the possible scores as ranging roughly from 0 to 100.

Results showed a range in average departmental morale score from 45.9 to 69.4, with an average of 57.1 for all employees. A further analysis revealed that these variations in morale were due largely to differences in supervision and leadership.

The average morale score of all salaried employees was 57.5 and of the hourly workers 56.0. Average morale of male employees proved somewhat higher than that of the women, and the scores of female employees with over 7 years' service, employed in the general offices of the company, were especially low. Male employees with from 2 to 7 years' service had a lower morale score than those with greater or less service. This suggested the possibility that men who entered the company during the depression had fared worse than those hired earlier or later.

In addition to calculating general "morale scores," certain of the statements in the attitude scale were used to measure employee attitude toward specific items in the personnel policy. Among some of the more significant findings of this analysis are the following:

(1) Approximately one-half of the factory workers were dissatisfied with the wage incentive plan, suggested the need for employee participation in the determination of job standards and piece rates.

(2) Seventy per cent of the hourly workers felt that there should be work sharing before layoffs, and more than one-half of these workers felt that recent layoffs had been handled fairly.

(3) There was considerable dissatisfaction among the salaried group with respect to the fairness of promotion policies and practices.

(4) A close relationship appeared between departmental morale and attitudes toward supervision and leadership.

Attitudes Toward Supervision.—The investigation described on pages 613 f. showed a marked effect of supervision upon production. A number of employee attitude studies have revealed that the supervisor plays a prominent part in determining the morale of employees. An illustration of this is to be found in a questionnaire survey conducted during 1940 by the Florida Power and Light Company.¹¹⁸ In this experiment all the employees of the Miami Branch of this utility were asked to fill out a questionnaire containing questions on working conditions in the company having a bearing upon employees' satisfaction. The questionnaires were unsigned and dropped by employees into the slot of a locked steel box. Each question in the questionnaire was followed by 5 answers expressing different degrees of satisfaction or dissatisfaction. Each employee checked the one answer to each question which expressed his feeling on that question. On the front page the employee printed the name of his department and on the back page printed any additional comments he wished to make having a bearing upon his satisfaction on the job.

A special committee of a dozen employees sorted the questionnaires by departments. The analysis of the questionnaires was made by a disinterested person from outside the company experienced in this type of work and centered particularly upon a study of the com-

parative "morale" found among employees in various departments of the company as determined from the expressions of employee attitudes toward various policies and practices.

Fig. 29, entitled "1940 Morale Profile," shows the analysis of the morale situation in one of the departments of this utility. The results indicate clearly that the "morale" problems of this department were not centered around wages, although, as the investigator points out, many people in the company assumed that "money tells the whole story of employee morale." Questions 23, 24, and 25 refer to wages. The attitudes of employees in this department toward wages are all above the corresponding company averages by the amounts of 10.6, 12.6, and 6.5, respectively. The largest deviation in terms of unfavorable attitude is with respect to Question 18, "Criticism in Public"; the value in this case is the 18.2 below the company average. This item is purely one of leadership. Evidently the well-known principle of refraining from criticizing employees in the presence of others had been violated flagrantly in this department.

Question 13, "Consideration and Courtesy Shown to Subordinates," reveals another source of unfavorable attitudes among employees in this department. In other words, the survey revealed that in this department, and, to some extent the company as a whole, the workers wanted more consideration, better treatment by the supervisory force. Such dissatisfaction as existed was not with the wage plan, but with the failure of the department head and his subordinates to recognize the workers' worth as human beings. The primary source of dissatisfaction was the disregard of the workers' feelings and sentiments. It is of interest to note that such findings, applying to a number of departments, led to an extended program of supervisory training in leadership techniques.

The Value of Employee Attitude Surveys to Management.—Employee attitude studies have furnished valuable information concerning employee attitudes and their relation to morale in individual plants. In addition to items already mentioned, wages, length of service, job security, sex, hours, conditions of work and surroundings, opportunities for advancement, social relationships on the job,

prompt and fair settlement of grievances, etc., have been found of importance in determining employee morale. The wide use of employee attitude studies is some indication that management is finding the materials of value. As Kornhauser points out, "findings almost always add substantially to management's previous information about its employees and very often contain startling surprises. Perhaps the greatest accomplishments have been in the way management is shocked out of its complacency with respect to employee satisfaction. Even where the results at first seem dubious to managers, further detailed inquiry into the situation usually reveals some genuine basis for the feelings expressed in the survey—a basis either in the objective conditions or in the subjective meanings these situations have been permitted to assume."¹¹⁹

Workers' Attitudes Toward Unions and the Regulation of Labor Unions.—The study of attitudes of workers in single plants has been supplemented by the attempt to measure the attitudes of workers as a group with respect to more general problems of labor relations in modern industry. Such, for example, was the aim of Chamberlin¹²⁰ who interviewed 200 men employed in textile mills in Massachusetts—100 union members and 100 nonunion members. Their answer to his inquiries indicated that 90 per cent of union members and only 38 per cent of nonunion members believed that the unions get results.

To a request for reasons for which they would join the union, nonunion men gave the following in the orders noted: (1) because fellow workers had joined; (2) a feeling of greater security; (3) because a union is the only way that the working man can get results; (4) a liking for such organizations.

The principal objection of nonunion men to unions was the union's failure to get results (45 per cent), with the type of leader running a close second (41 per cent).

Both union members and nonunion members showed remarkably emphatic agreement that the strike is not the only way workers can get results, 87 per cent of union members and 100 per cent nonunion members answering "no" to the question on this item. However, there is close agreement between union members and nonunion

members that bankers and inventions are the causes of depression. Moreover, 88 per cent of union members and 65 per cent of non-union members agree that mill owners do not treat the working man like a human being.

More recently nation-wide samplings of workers were interviewed with respect to their attitudes on the Taft-Hartley Law.¹²¹ It was found that 7 out of 8 had heard or read about this law designed, in large part, to provide closer regulation by the Federal government of the activities of labor unions and their leaders. Of all employees interviewed, 54 per cent *disapproved* of the bill; of union members 64 per cent *disapproved*. The same workers were asked how they, as Congressmen, would vote on laws to do specified things, without being told that these were already provided for in the Taft-Hartley law. Notwithstanding their firm disapproval of the Taft-Hartley law as a whole, the majority of employees interviewed, as indicated in Table X, favored every feature put to test, and a majority of union

TABLE X.—EMPLOYEE ATTITUDES ON DETAILED FEATURES OF THE TAFT-HARTLEY LAW

<i>Favor law to:</i>	<i>All Employees, Per Cent</i>	<i>Union Members, Per Cent</i>
Require 60-day cooling off period	78	70
Allow companies to sue unions	77	70
Allow freedom of speech for employers	69	61
Require union financial reports	86	85
Prohibit Communist union leaders	76	77
Prohibit union political contributions	56	50
Allow checkoff only with worker's consent ...	68	74
Allow union shop only with majority vote	79	77
Outlaw closed shop	60	48
Delay strikes in public service industries	78	70

members favored every feature but one. Later research by Gleason¹²² suggests that information about the Taft-Hartley Law is not a determiner of attitude toward it, that the law is an "emotional symbol" to workers, and that presentation of facts concerning it is not likely to influence their attitudes toward the law.

Communication and Cooperation.—As indicated earlier, industrial psychology has displayed an ever-increasing concern with sentiments, feelings, attitudes, and with the interplay of personal relations in the industrial plant. Involved here is the consideration of the entire complex of human personality as it functions in the industrial setting,¹²³ and the experimental study of group relations in industry, particularly in terms of the problem of *communication* between worker and management.¹²⁴

Studies by the *Survey Research Center* indicate that the successful supervisor (production-wise) is one who is "personnel oriented."¹²⁵ Experiments in group participation have suggested that decisions by informed groups can be effective in increasing production and in expediting technical change.¹²⁶ Observations drawn from the field of social psychology, from the functioning of joint labor-management committees, and direct experimentation lead to the opinion that the psychological growth of labor-management relations is no more than the psychological growth of the participating individuals and of the groups into which they are formally or informally united.¹²⁷

The Place of the Psychologist in Modern Industry.—Among the few great questions of our age is that which asks what modern industry means to the individual worker in terms of his satisfaction and fullness of life. The accumulation of evidence and the formulation of adequate procedures for promoting both efficiency and satisfaction at work present a continuing challenge to the industrial psychologist, to labor, and to management. The psychologist is in a particularly happy position as the active agent in cooperative effort in meeting this challenge, since his is primarily an impartial outlook—the attitude of the observer who is basically interested in human beings and in their social adjustment. As Harding¹²⁸ has pointed out, "Industrial psychology is impersonal, impartial, and independent of political structures." Its origins and applications are found not in the industrial system, but in the very nature of work itself. It should be thought of "as the psychology of work." And "so long as people have to work (or want to), psychology will continue to offer its contribution towards insuring the efficiency of their work, towards helping them to achieve their ends with the least misdirection of effort."

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CHAPTER XVIII

PROFESSIONAL PSYCHOLOGY

By DOUGLAS H. FRYER, PH.D.

New York University and Richardson, Bellows, Henry & Co., Inc.

All problems of existence are psychological in so far as human behavior is involved. Some, which at first sight seem to be entirely physical problems, usually have an important psychological aspect. Among these, the illumination or ventilation of factory or school become psychological when their relation to efficiency and satisfaction in work are of major concern.

Applied psychological knowledge has been accumulating rapidly during the last fifty years. In addition to problems already mentioned, psychologists are working upon such problems as:

- What type of print is best for reading.
- What effect a short- or long-period goal has on learning.
- What is the effect of visual defects on accidents.
- What psychological therapy is desirable for the physically ill.
- What errors are to be expected in legal testimony.
- What form and size of advertising copy is most attractive.
- What is the personal background of skill fatigue.
- What the public actually thinks about various issues.
- How competition develops in children.
- How personal background may be used to predict success.
- How children's values are affected by socio-economic status.
- How age of college entrance is related to academic success.
- How one can examine criminals to get at the truth.
- How machines and tools may be built from the man outward.

This is but a sample of the problems of psychological study. The areas of their professional application can be interpreted as scattered throughout all forms of social adjustment.

Certain areas of human adjustment are of such great concern that psychologists have become specialists in the study and solution of the psychological problems of the area. Educational, clinical, personnel, and industrial psychology illustrate this point, and there are separate chapters discussing these areas in this book. This chapter considers other areas of professional development.

One section in this chapter deals with college personnel and the methods of selection and adjustment of college students; another deals in a similar manner with professional personnel. Psychology has accumulated information of value to lawyers—sometimes referred to as legal psychology—and to those concerned with sales and advertising—sometimes referred to as consumer psychology. Sections of this chapter are concerned with these areas. The measurement of attitudes and public opinion, which have occasioned widespread popular interest, will be discussed in a final section of the chapter.

COLLEGE PERSONNEL

The function of the academic college, according to educational tradition of the Middle Ages, was to furnish intellectual stimulation to a select few determined by class or social status. This view has been greatly modified in the American system of education so that it may truly be said that the American college and professional school is a continuation of public education—paid for often from the public treasury—for youths who have demonstrated ability to profit from it. Its function is the development of these young people for important places in society.

With this purpose, the college personnel program is concerned with the adjustment of the student as a step in life's adjustment. Selection of those qualified to enter college—their guidance into college—is its first task, but this is only the beginning. Group and individual guidance is offered in planning study programs for cultural and professional development. Help is given in learning how

to perform mental work efficiently. Personal problems are discussed as they arise. Guidance is offered generally in the problems of dormitory, fraternity, and sorority living, in campus organizations, social functions, publications, glee clubs, orchestras, bands and sports. This guidance leaves the initiative and motivation with the individual student. Its goal is to offer full information about all problems of college life.

Psychological research has contributed extensively to an understanding of the intellectual problems of college adjustment. College aptitude tests have passed their thirtieth birthday of recognized usefulness and they have radically improved the college classroom by reducing the number of those of low intellectual ability entering and staying in college. Comparatively recently attention has centered on the influences of varied individual student problems, such as parental attitudes, college roommates, and the effect of the personalities of teachers upon classroom achievement. Illustrative of the broader problems of student guidance, 73 freshmen in one college reported 5959 difficulties in which they required guidance, but of these only 714 or 12 per cent were related to courses of instruction.¹ No student enters college without some problem arising which seemingly is far removed from the intellectual activities of the college but which limits his adjustment to them.

Testing Intellectual Adjustment.—The testing of college students to guide them in their mental adjustment had its beginnings with J. McKeen Cattell, as early as 1890, in the study of individual differences at the University of Pennsylvania. The tests used by Cattell were of sensory and motor functions. But gradually tests of more distinctly mental function were developed. Correlation coefficients between tests of mental functions and academic grades have indicated the usefulness of such tests in predicting success in college. The average (median) of the coefficients for eight investigations prior to 1918 was .34. This was a pioneer period in college aptitude testing.

Use of the General Intelligence Test.—The general intelligence examination was developed for group testing during World War I

(1917-18) upon the principle of measurement by sampling abstract and symbolic mental activities. The Army Alpha Examination, with its five alternate forms, was adopted, upon its release by the Army, in the personnel programs of many colleges, and it was used widely for several years as an aptitude examination prognostic of educational development. Many regarded the general intelligence examination as a solution for all student selection problems, and much higher relationships were expected between intelligence scores and college grades than were found to exist. Segal² has assembled coefficients reported in numerous studies, and he computed an average (median) of sixteen correlation coefficients between Army Alpha and first year college grades of .44, with the range of the middle 50 per cent of these coefficients from .40 to .50.

Introduction of the College-Aptitude Test.—The college-aptitude or scholastic-aptitude test is a specialized development of the general-intelligence test. It measures only at the superior level of intellectual activities. It is based on the same principle of measurement by sampling symbolic mental functions, but it depends more in its sampling of problems on secondary school experience than does the traditional general-intelligence examination.

Various colleges developed their own college-aptitude tests in the early twenties, and college associations have issued yearly forms for their constituent colleges. Columbia College inaugurated the first plan of admissions in which a general-aptitude test was used as a criterion of selection. This test, which then was called the Thorndike College Entrance Examination for High School Graduates, is known now as the CAVD Test (completion, arithmetic, vocabulary, and directions), and it is issued yearly in alternative forms for use by various colleges. The American Council on Education has maintained an examination service for more than twenty years and it supplies many colleges yearly with the American Council on Education (or ACE) Psychological Examination. Practically all colleges now administer a general-aptitude test as a part of their admissions program. But probably no college uses such a test as the sole criterion for the selection of its students.

Relation between General College Aptitude and Scholarship.—Literally hundreds of studies have reported upon the validity of the general college aptitude test in predicting college scholarship. The ACE Psychological Examination is typical of the college-aptitude tests marketed for general use. For this test, Segal² reports an average (median) for 34 correlation coefficients of .48 with first-year college grades. The range of the middle 50 per cent of the coefficients is from .40 to .55. Correlations with second, third, and fourth-year scholarship are usually lower. College-aptitude tests devised for use in a particular college often yield higher correlations with college grades, ranging up to .70. As this implies, the college-aptitude test which is devised and standardized for the local situation is usually the better test.

Prediction of Scholarship from Achievement.—General achievement examinations, testing knowledge of secondary school subjects, have been developed for the prediction of college scholarship, and secondary-school grades always have been used, of course, for this purpose. Special aptitude tests for most college subjects have been tried at various times. But seldom are the coefficients reported between them and scholarship in their special subject higher than for a general-aptitude test. In fact, the rule is the reverse and often a special-aptitude test in one subject will predict college grades in another subject better than in the subject for which it was prepared.

Predictive Value of Secondary School Grades.—Segal and Wagner² have assembled separately from 50 to 100 correlation coefficients reported in investigations of the validity of secondary-school average grades in predicting college grades and agree on an average coefficient of about .55, with a range of the middle 50 per cent of the coefficients from .50 to .65. This relationship is with college grades at the end of the freshmen year. Correlations between high-school grades and grades in college at the end of the second, third, and fourth years are relatively lower.

Secondary-school grades are the best single criterion for prediction of college scholarship where they are appropriately weighted

and interpreted. But enormous differences exist in the grading systems of secondary schools, which makes it difficult to use this information effectively in selecting students for college where grades are assembled from various parts of the country. The secondary-school grade is a less stable measure, and less easily handled, than test results. The use of tests of both general college aptitude and general educational achievement has been increasing because of their practical efficiency.

The Educational Achievement Test.—The College Entrance Examination Board test is representative of general educational achievement tests; and the average correlation coefficient with first-year college scholarship, as reported by Segal,² is .46. Correlation coefficients with college scholarship for other general achievement examinations, such as the New York State Regents Examination and the Iowa Placement Tests, are somewhat higher than this. It may be that the general achievement examination of secondary-school subjects could be made a slightly better predictive measure of college scholarship than the general college aptitude test. But it is not used so widely because it duplicates in large degree a measure of scholarship already available in secondary-school grades. Achievement tests in special subjects form parts of the general achievement examination, of course; and tests in special subjects, such as mathematics and English, are often included in the examination program for admission to college as an aid in sectioning of classes or guidance in preparing study programs.

Other Measures.—Other measures for prediction of college scholarship besides those already mentioned include reading-test scores, character ratings, psychoneurotic-inventory scores, attitude and interest scores. Equations weighting various measures according to their contribution are being investigated in an endeavor to predict college success more accurately. This method allows one to use valid items for prediction from the personal history, such as age, time spent in study, size of family, paternal occupation, part-time employment, and ratios of relatives graduating from college. Investigators have found neurotic students to be better scholars than

their better-adjusted fellows in some colleges and the reverse in other colleges. Segal and Proffitt³ have assembled results of studies in three universities showing an average correlation coefficient of $-.28$ between age of entrance into college and scholarship. But students who spend a few years between secondary school and college make better grades, on the average, than do students entering immediately after graduation from secondary school. The findings in use of personality predictors vary from college to college and are often contradictory. It is desirable to use such measures as can be made available in the guidance of the student into college and throughout his college career. But it is even more necessary than with scholastic predictors to establish their validity in the particular college in which they are to be used.

Combination of Measures for Predicting College Success.—

The degree of the prediction from two or more measures is indicated by the multiple-correlation coefficient. Segal and Wagner² agree in reporting an average multiple-correlation coefficient of combinations of predictors of college scholarship of about $.65$, with the range of the middle 50 per cent of the coefficients that have been reported from $.60$ to $.70$. There is little likelihood that prediction of college scholarship can be made with greater accuracy than this, as it depends in part upon the reliability of the college grading system. Instructors vary in their grading, and predictive measures would not be expected to correlate higher with college grades than the grades correlate with themselves. While the reliability of grading varies for different colleges, it is usually not higher than the coefficient given above for the combined predictive measures of scholarship.

The Personal Problems of the College Student.—

After college entrance, emphasis in guidance is more upon the personal problems of the student. It is the purpose of the Dean's office or the Personnel Office to deal systematically with personal difficulties which are reflective of maladjustment. Through interviews, the student's problems are understood and factual information is placed before him that may assist him in learning how to live in a college

community. Mental-hygiene problems often are handled by a psychiatrist with office hours at the University, as are general medical problems by a physician. Certain large universities maintain a staff of trained counselors who have their regular student clientele with files summarizing the problems of individual students and their solutions.

The Search for Causes of Maladjustment.—The college probation system is supposed to provide the motivation for “catching up” when behind in study. An analysis of the probation system in one college by Henry⁴ shows that it does not do so. Only one-fifth of freshmen probationers and about half of the later ones finally graduate. Yet Henry shows that these probationers do not differ from the average student in general intelligence, in secondary-school grades, in regents-examination grades, in age, number of high-school units, subjects liked best and least, weight, height, etc., etc. The causes are to be found elsewhere in college life.

In the study of Emme,¹ referred to earlier, the student consultant classified the 5959 adjustment problems of the college freshmen into 19 areas of difficulties in order to indicate whether (1) low intelligence, as measured by the American Council on Education Psychological Examination, (2) high neurotic tendencies, as measured by the Thurstone Personality Schedule, or (3) low socio-economic status, as measured by the Sims Inventory, Form C, accompanied any of these groups of problems. Low intelligence accompanied the problems of only three of the nineteen areas, that is, educational-guidance problems, economic problems, and relations with teachers outside the classroom. High neurotic tendencies accompanied the problems of six areas, that is, in the use of the library, classroom problems with teachers, problems related to other groups of people, personal student relations, religious problems, and problems related to administrative officers. Low socio-economic status accompanied the problems of seven of the areas, that is, economic difficulties, educational guidance problems, health problems, religious problems, library problems, vocational problems, and relations with teachers outside the classroom. The importance of low

socio-economic status and high neurotic tendencies in college adjustment is supported by the similar findings of other investigators. It is evident that they are the causes of many difficulties arising in college life and have an indirect effect upon classroom work.

Concluding Statement on College Personnel.—Academic colleges differ in their specific functions in education and in the cultural and intellectual levels of their student populations. In a list assembled by Pintner,⁵ the intelligence-test averages (medians) of students in different colleges have a range of more than forty Army Alpha points. Less tangible but just as real are their differences in social standards. Their curriculum is indicative of their function. But all of them fit into the mold of American education in which the purpose of the college is conceived as training for life and its task that of individual student guidance.

With this essential goal, psychological and personnel research has contributed to an understanding of intellectual adjustment and has had some measure of success in indicating the varied and related problems of this adjustment. This contribution to the college personnel activities has been but briefly reviewed here. The statistical methods of prediction, the interpretation of knowledge gained through research, and the guidance techniques of college personnel form a field of work which is a profession in itself and the student who wishes further information of it may consult selected references (Bennett; and Paterson, et al.)⁶ at the end of this chapter.

PROFESSIONAL PERSONNEL

Psychology has everywhere, in its contributions to personnel work, stressed the importance of differences between individuals. Measures of these differences have been developed and used by professional schools as well as academic colleges in selection and in adjustment of students to professional training.

Special Professional Aptitude.—A descriptive picture of the different professions would give one the idea that there exist tasks which definitely distinguish them in their mental requirements. For

example, one might conclude that to be successful in dentistry one must have special aptitude in making fine discriminations of color and brightness of teeth, odor of decay, form of cavity reflected in a mirror, and in particular, in the performance of minute coordinations and skillful movements of the hand. In fact, special tests for such qualities were included in a battery of psychological tests administered to all persons wishing to prepare for dentistry in Germany (1932)⁷—a testing program sponsored by the National Association of Dentists of Germany. The value of these special aptitude tests was never determined. However, the results of a trial of special aptitude tests for dentists has been made by Harris,⁸ and these results are representative of what is known of the measurement of special aptitude in other professions.

Harris used several mechanical-aptitude tests, a general-intelligence test, and college grades to predict success in dental college. The Wiggly Block Test, Finger Dexterity Test, and the Tweezer Dexterity Test of O'Connor, a Hand Steadiness Test, and a Cube Carving Test were used as the mechanical-aptitude tests; the Otis Self-Administering Test of Mental Ability, Higher Examination (Form B), was the measure of general intelligence; and total predental average and science predental average in college were the scholarship measures. First-year average grades and four-year average grades in dental college were the validity criteria. The predental total averages and the predental science averages correlated with the first-year averages in dental college with coefficients of .44 and .41 and with the four-year averages with coefficients of .53 and .59. The general-intelligence test correlated .55 with the first-year averages and .36 with the four-year averages. These are expected relationships. But none of the mechanical-aptitude tests correlated with the two validity criteria with coefficients higher than .15 and the reliability of these coefficients was unsatisfactory. Thus it seems that special aptitude tests are of little value for predicting success in dental college. Aptitude is not regarded as specific for a given profession.

Testing General Professional Aptitude.—The general-aptitude test used in the various professions to predict professional

school scholarship is similar to the college-aptitude test, but usually its problems are clothed in the terminology of the profession. The assumption at its basis is the same as that of the general-intelligence test. It samples symbolic mental operations, but the problems are of an order of difficulty comparable to the intellectual level of the professional school. More and more, psychologists have realized, as experience has been accumulated in mental measurement, that uniform individual motivation or cooperation is essential to a group-testing program, and it is believed that this is accomplished best in testing professional aptitude through the use of the problems, ideas, and language of the profession.

Professional aptitude examinations are administered in schools of medicine, law, engineering, theology, education, dentistry, commerce, nursing, etc., and in various academic departments of graduate schools.⁹ The validation results of most professional-aptitude tests are retained as confidential information of professional organizations. But from whatever evidence is available, it is indicated that professional-aptitude tests correlate with scholarship in professional schools with coefficients usually between .40 and .70, and perhaps with an average correlation higher than that between college-aptitude tests and college scholarship which is reported as .50.

Graduate Schools.—The Graduate Records Examination has been developed for selection of graduate students. This is an achievement examination of general scholastic ability at about the conclusion of college. It has various subtests which are differentially scored, including mathematics, social science, physical sciences, biological sciences, literature, chemistry, fine arts, and foreign language. Indications are that this test predicts scholarship in any professional school as well as the profession's own general-aptitude test—if not better.

Teachers' Colleges.—A general-aptitude test often is used by teachers' colleges as a criterion for certification as well as for guidance into teaching. The Coxe-Orleans Prognostic Test of Teaching Ability, which is one of the standardized tests for teachers' colleges, measures the applicant's observation of teaching practices, his ability

to understand educational subject matter and to analyze educational problems. Coefficients in ten normal schools between scores and freshmen grades are reported as having a range from .53 to .84. Aptitude for teaching is distinguished from aptitude for scholarship and correlation coefficients between estimates of teaching ability and aptitude tests are not nearly as high as between tests and grades.

Medical Schools.—Aptitude measurement has been supervised since 1930 for accredited medical schools by the Association of American Medical Colleges with its Committee on Aptitude Tests. Its test, the Medical Aptitude Test (Moss), measures comprehension, memory, logical reasoning, and scientific vocabulary and understanding, and its problems are stated in the form of a medical diagnosis. Early use of this test was highly promising. It was reported by the American Medical Association that it predicted 69 per cent of actual failures and excluded few potential graduates. But the test was found to be erratic in its prediction from year to year and from school to school, and in 1947, the Association recommended that medical colleges might replace it with the Graduate Records Examination.

Law Schools.—The content of law-aptitude tests usually is pertinent to the legal profession and includes mental problems involving legal reasoning without legal knowledge. The same abilities are measured as in other professional aptitude tests. The Ferson and Stoddard Law Aptitude Examination measures accurate recall, comprehension, and reasoning by analogy, analysis, and logic, and it is used by a number of law schools. Various schools have developed their own professional-aptitude examination. One leading law school uses a power examination (no time limit) of general mental ability.

Engineering Schools.—Mechanical aptitude is considered to be a prerequisite of the engineering profession, and high ratings in mechanical-aptitude tests, of which there are a large variety, are thought to be indicative of professional success. But here, as elsewhere in the professions, the general-aptitude test correlates higher

with college work in engineering than any test or battery of tests of mechanical aptitude. The engineering college aims to furnish a broad symbolic education in the mechanical activities of a modern civilization. While its specializations appear to be essentially mechanical, e.g., hydraulics, aeronautics, sanitation, or mining, the modern engineer is likely to be an administrator, executive, or salesman.

General aptitude examinations designed for particular professions do a similar job for that profession as do college-aptitude tests in the selection of students for academic colleges, and in large measure they are equally successful. It is interesting that a general scholastic-achievement test—the Graduate Record's Examination—is equally predictive with such tests in selecting successful students for various types of professional training. Either the different professions do not require distinctive abilities, or distinguishing qualities for the professions are not discernible at the level of college graduation.

College Scholarship.—College scholarship is, without doubt, the best single predictor of professional-school scholarship. As a rule, it correlates somewhat higher with professional-school scholarship than does high-school scholarship with college scholarship. But because marks in different colleges vary considerably in their predictive value, it usually is found desirable for the professional school to rely considerably on its professional-aptitude test. Professional schools, even more than academic colleges, recruit their students from different areas of the country. Often, a weighted combination of college scholarship and scores on a professional-aptitude test is used in selection. College scholarship in any particular subject or group of college subjects has not been found to predict professional-school scholarship as well as the general college average.

Other Indicators.—The Strong Vocational Interest Blank, with forms for both men and women, and with scoring keys for many of the professions, is used by various professional schools for guidance purposes to show whether or not the individual applicant has the interests of men already in the profession.

Other indicators of potential professional development used by professional schools, either for selection or guidance, follow: Ratings assembled from college instructors, interview with applicant, personal history, statement of purpose by applicant, and personal references. No validation of these devices as to their prediction of professional success has been made. Personality inventories are sometimes included in the selection procedure of professional schools. They would seem to serve a purpose in weeding out those unfit emotionally for work in the profession. Unfortunately in their present state of development, both the interest inventory and the personality inventory can be manipulated by the applicant, which reduces their value as a selection device.

Predicting Professional Success.—Many intangible characteristics enter into making an individual successful in his profession after he has completed his training for it. Motivation, social viewpoint, morals, morale, professional ethics, “right” connections, opportunity, determine his future in large measure, and often in larger measure than the skills he gained in professional training.

Almost no attempt has been made other than in the teaching profession to predict any other qualification than scholastic success. The difficulties of establishing criteria of success in professional practice are great. In the teaching profession ratings of such personality qualities as liking children are used as criteria, and some success has been attained in predicting good teachers.

Work on the prediction of professional success, thus far, then, has been limited mostly to the training period while the student is in professional school, with professional school grades as criteria. As previously indicated, results upon this point have been quite satisfying. Beyond this no one knows what qualifications are essential for the successful professional man, or how they can be predicted.

Concluding Statement on Professional Personnel.—The professions as a group are at the top of the occupational ladder in intellectual qualifications. There are differences in the average of intelligence scores of professional groups, but distributions overlap to a

high degree, and critical ratios * for these differences are probably not significant between many of the professions. Their intellectual requirements are similar.

Students of medicine, law, and engineering rank highest in average intelligence scores. Those in education and agriculture are somewhat lower, and those in dentistry, pharmacy, and nursing are lowest of all. Students of engineering college equal those of academic college in intellectual level, with those of teachers' colleges being slightly lower. Schools of the same profession in different parts of the country differ considerably in intellectual requirements, as do the academic colleges.

The professions rank highest of all occupations in social prestige. The following order among the professions is established from the rankings secured by Hartman¹⁰ among persons of varied socioeconomic levels: Doctor, lawyer, engineer, and teacher, with college professor of equal status with lawyer, and clergyman and dentist ranking above or equal with the teacher. The elementary-school teacher ranked lower than the high-school teacher and principal or superintendent. The nurse ranked lowest, and the elementary-school teacher second lowest, in prestige among the professional occupations, but both were above the large body of business and commercial occupations which ranked next in prestige among the occupations generally.

CONTRIBUTIONS TO THE PROFESSIONS

Facts and methods of the scientific laboratory have wide application generally in the problems of the various professions. Suggestion plays an important role in inducing and exaggerating the symptoms of disease, and the physician must distinguish what is organic from what is psychological. Human motives determine whether a person ignores an important symptom of disease which should have immediate treatment or if he visits several specialists for examination because of "normal feelings." The study of psychology is useful in any profession that is concerned with the efficiency and happiness of human beings.

* See page 376 for explanation of "critical ratio."

A Few Specific Contributions to the Professions.—Knowledge of the functional effects in vision of such factors as convergence, accommodation, two-point discrimination, stereoscopy, constancy of size, and the equivocality of visual stimuli generally, which is gained in laboratory experimentation, has a specific bearing on the work of the oculist, optometrist, and the specialist in stage and office lighting. Similarly, the experimental facts of audition, smell, taste, and the other senses serve a useful purpose. The criteria of visual space which we learn through years of experience are turned back on us by the artist in portraying depth, size, and movement on the canvas. Knowledge of odor compensations, mixtures, and variability in fatigue should be useful information in the preparation of acceptable diets and perfumes, and psychometric scaling methods are available to determine their degree of acceptance. Any theory of acoustics cannot violate the facts of binaural intensity and time differences; nor can a program of animal training ignore the conditioned reaction formula which has been worked out with such exactness in animal psychology. Innumerable facts of the laboratory are useful to the professional specialist. Such knowledge gradually filters into common usage as a free scientific contribution to human welfare.

Contributions to Human Welfare.—A scientist often sets out to solve a particular problem the solution of which will be of inestimable value to society. Such an investigation in psychology usually starts with an analysis of the factors involved in the activity and it may entail, and usually does, research extending over years. Alfred Binet of France at the turn of the century and until his death, and then Lewis Terman of the United States, with a host of collaborators, developed our modern measures of general intelligence, first, by an analysis of mental capacities and, later, through the standardization of the tests. This is an old story which is told more fully elsewhere. The intelligence measure is an outstanding contribution to human welfare and it is a useful tool for all professions, although its administration and particularly its interpretation require the training of the specialist.

Similarly, Strong, along with other collaborators, has contributed a measure of human interests indicating the direction of occupational

development giving the greatest individual pleasure. This is an extremely useful measure for the vocational counselor. Also, Thurstone has established a technique which indicates the degree of radical or conservative thinking upon any problem, making possible a measure of attitude. Such measures are particularly useful to personnel officers in industry and to government officials.

From the laboratory comes the knowledge that discrimination of temporal intervals has the lowest threshold for pressure. Fifteen hundred stimuli per second can be distinguished on the most sensitive cutaneous surface while in vision separate stimuli fuse into continuous or moving stimulation at about 24 per second. Temporal discrimination of pressure is the basis of the vibratory sense, and Gault has developed a language in vibrations for the use of the deaf-blind. Seashore has analyzed the factors involved in musical talent over years of painstaking investigation, and he has prepared phonograph records measuring the basic sensory discriminations involved in musical talent. These are used widely by teachers of music as tests of musical aptitude.

Other similar analytical contributions might be mentioned, but these illustrate the manner in which the psychologist approaches a problem necessary for solution in the interest of social welfare. All important contributions of this kind have been made in the twentieth century. Psychology is indeed a young science.

Contributions to Method.—Perhaps of greatest value to other professions of all that has been contributed by psychology are the methods that have been developed to secure an exact statement of fact or opinion from another person, where it is impossible for the examiner to determine otherwise the accuracy of what he learns. This is, of course, the scientific method as applied to the study of conscious activity. Medical diagnosis is based in part upon the statement of the patient. The lawyer examines a witness to determine the accuracy of his report. The politician checks to find out if expressed opinion of his program is representative. It is essential in all professional work to determine the validity or correctness of personal statements irrespective of belief as to their truth or falsity.

Notable advances have been made in the laboratory in securing an exact report of conscious activity. The descriptive introspection is used to outline the factors involved in any such activity. Psychophysics offers controlled techniques where magnitude of stimulus is related to quantity of sensitivity as in determining the apparent size of a letter that is normally visible. The psychometric scaling methods determine relative magnitude of feeling preferences and of sense discriminations. Through their use knowledge is gained of the relative values of simple and complex stimuli in everyday life, such as colors, odors, pains, textures, wall paper, house paint, textile designs, advertising copy, etc. These are definitely laboratory methods. Precision in their use is necessary for observer as well as experimenter. But through their study the conditions for accuracy of the psychological report are established.

Contact between the professional specialist and his client is of the nature of an interview, and industrial and clinical psychologists in particular have developed the interview as a quantitative tool in a manner similar to a standardized psychological test. The response to a question, where the variability of response is known, is of the nature of an item in a test. But the interview is less formal and forbidding than a test. As frequently used it consists of questioning by an experienced examiner who does not know the answers to his questions but who can judge their accuracy through their possibilities of accuracy and who, through check questions, can establish the reliability of the answers.

LEGAL PSYCHOLOGY

Psychology's contribution to the legal profession, often referred to as legal psychology,¹¹ is concerned with the problems of unsocial motivation, the mentality of the delinquent and criminal, and with the methods for the detection of crime and the determination of the accuracy of testimony.

The Accuracy of Testimony.—Reference has been made to the accuracy of the psychological report. Research has indicated numerous errors of perception from which inaccuracies in the report

may arise, as in the localization of a sound or the color of an object under varying intensities of illumination. Estimations of time vary according to the events encompassed in a temporal interval and they differ enormously between individuals even for the unusual situation where there is intention to observe duration. This is likewise true of estimates of rates of movement which are offered in testimony of the speed of an automobile involved in an accident. Errors of memory, which increase with elapsed time and with the greater inaccuracies for events observed only once, add to the difficulties of securing accurate testimony. Intentionally observed events are remembered better than casually observed events, but the report of a witness is seldom based on the intention to observe and to remember. Accuracy in casual observation of events concerned with people is vastly greater than of events concerned with things. Suggestion influences the report of a witness and in this instance the methods of questioning may determine the nature of the report, as is recognized in court procedure.

Various laboratory experiments have been performed upon the accuracy of testimony, which indicate that the methods of securing evidence influence its reliability. Marston¹² tested the reliability of the free recital, the direct examination, and the cross-examination. The direct examination secured 31 per cent of 150 items into which the event was analyzed, the cross-examination secured 29 per cent, and the free recital 23 per cent. But 94 per cent of the items actually reported in the free recital were accurate, whereas only 83 per cent were accurate in the direct examination and 76 per cent in the cross-examination. The oath reduces errors in testimony; sworn testimony is more accurate, but it is less complete. Trained observers, such as journalists and detectives, are more accurate in the reporting of events, as might be expected.

Detection of Crime.—Münsterberg of Harvard University was an American pioneer in the application of psychology to useful purposes. Early in this century he suggested word associations, breathing, circulatory changes, and involuntary movements as symptomatic of deception, and their measurement as useful in the detection of

crime. Many of the measures used today for this purpose were first worked out in his laboratory.

The measurement of deception is a different problem from that of the determination of the accuracy of testimony. In deception there is intention to deceive while in testimony there is intention to tell the truth—the witness believes he is telling the truth. This is the ideal, of course, with much deviation in actual practice. Measures of deception are based on the hypothesis that in avoidance of a true response or accurate statement, where a question must be answered or an act performed that is related to a crime, there will be a disturbance of normal verbal or physiological functions.

“The Lie Detector.”—Any setup of apparatus arranged to measure symptoms of deception may be called a “Lie Detector.” The cardiograph, measuring heart action, the pneumograph, measuring breathing, the sphygmometer, measuring blood pressure, the chronoscope, measuring reaction time, the galvanometer, measuring strength of electric current, and other apparatus, are instruments often applied in lie detection. The name of “Lie Detector” was ascribed by a newspaper reporter to Marston’s experimental setup for testing deception in Münsterberg’s laboratory at Harvard in 1915. This setup included a chronoscope and voice key, a pneumograph and kymograph, a sphygmometer and stethoscope. Various combinations of apparatus and techniques are called lie detectors today.

Essential to lie detection is the determination of the validity and reliability of the techniques used in its measurement. The four leading techniques in use today follow: (1) The free-association reaction test, (2) I/E Ratio test of inspiration-expiration, (3) the psychogalvanic reaction test, and (4) the blood pressure test. Their validation will be discussed below. As suggested by Münsterberg, diffused movements increase in deception to such a degree that they are measurable. It is possible that facts known about muscle reading, eye movements, and facial expressions may be applicable in measuring deception at some future date.

Free-Association Reaction Test.—The free-association reaction technique, which was developed by Jung, was the first scientific

method to be tried in determining the truth of a report. It consists of the presentation of a series of words with instructions to respond as rapidly as possible to the stimulus word. Two kinds of stimulus words, called crucial and noncrucial words, are distributed in the list, with the crucial words related to the crime. Through the use of a voice key and reaction-time apparatus the time of the reaction may be recorded in milliseconds. The associated word is noted for analysis of its significance. The assumption of the measurement is that the guilty person will inhibit his associations to words related to the crime, thus increasing his reaction-time, and that he will respond with unusual or stereotyped words. The average "times" of the crucial and noncrucial words are computed as a quantitative indicator of disturbance of free associations and the response words are studied for suggestions of suppression of knowledge or greater knowledge than should exist.

Numerous laboratory studies of artificial crime situations have been made by means of this technique with considerable success in the detection of the guilty party. Crosland¹³ describes its use in the determination of guilt among members of college fraternities where actual thefts had occurred. There were seven crimes and about ten suspects were examined for each crime. The guilty persons for six of the seven crimes were indicated correctly by the test according to later confessions and recovery of the stolen articles. But practical applications of the technique in crime detection are not numerous. This is due to the difficulty of securing a list of crucial words stimulating disturbances in the responses of the guilty party and not of other suspects, for most of the details of a crime are publicized generally.

The I/E Ratio.—A breathing test of deception has been devised by Benussi,¹⁴ an Italian psychologist, following his discovery that the ratio of the time of inspiration to that of expiration was greater before truth-telling than before lying; and with the inverse holding true after the statement is made. This measure is called the I/E Ratio. The technique includes the use of a pneumograph and tambour contacts recording on a kymograph. A question is asked the subject

who is required to wait several seconds before replying in order that the emotional effect may be recorded in the breathing. Laboratory trials of this technique have been singularly successful, but the method is extremely laborious because numerous measures and mathematical computations are required, which is the reason why the I/E Ratio is not used in actual criminal detection. But breathing records are taken, often, for the suggestions they may contain.

The Psychogalvanic Reaction Test.—The psychogalvanic reaction test is a measure of changes in resistance to insensitive electrical current through the skin surface, usually at the hand where perspiration is more likely to decrease resistance. Extensive research in the study of emotions with this technique has not led to any definite conclusions, since galvanic readings are related to almost any change in the human subject, such as movements of muscles and conscious ideas, as well as emotional disturbances. Ruckmick¹⁵ has experimented extensively with this technique in the laboratory and believes that it may prove valuable in crime detection. Summers¹⁶ has reported a few cases in actual practice. But the method is probably the least valuable of the four leading techniques.

Systolic Blood Pressure.—While working in Münsterberg's laboratory at Harvard, Marston¹⁷ found that a record of systolic blood pressure showed changes that were symptomatic of deception. This is a most useful discovery because it can be applied to the investigation of deception in actual criminal cases. Marston has told his story of crime detection.¹⁸ A discontinuous record of blood pressure is taken, as is done by the physician, with a sphygmometer. The rubber sleeve is bound around the upper arm and inflated, checking the flow of blood. Then pressure is reduced until the first pulse beat is felt at the wrist. The reading of blood pressure is taken as the amount of pressure in the bag that is overcome by the pressure in the arteries. A continuous record can be taken and recorded on a polygraph with a low degree of pressure in the bag of the sphygmometer.

In Marston's original laboratory experiment the subject was given two accounts of a crime implicating a friend, one furnishing him an alibi and the other including evidence against him. He de-

fended this friend in cross-examination on two occasions, once with the alibi and again by lying out of the evidence against him. The differences between the lying and truth-telling accounts were convincingly indicated by differences in blood pressure. Other laboratory studies showed the method to be singularly successful in separating the false and true report.

Marston continued to develop the discontinuous blood pressure technique during World War I, and Larson carried on investigations in the police departments of Berkeley and Los Angeles using the continuous method and combining it with breathing records. Marston¹⁸ reports that Larson tested 861 suspects, clearing 310 from suspicion and securing 182 confessions in this work. Larson¹⁹ says that the technique was extremely useful in eliminating suspects and suggesting clues. Marston¹⁸ reported in 1938 that more than 100 police departments practiced scientific lie detection, that lie detection records were admitted into trial courts in at least four states, and that over 25,000 cases had been examined, thus validating lie detection in practice.

Commercial Lie Detectors—Most commercial lie detectors include both a continuous blood pressure record and a breathing record, as in the Berkeley Psychograph and the Keeler Polygraph. The Darrow Photopolygraph combined a record of blood pressure, respiration, reaction time, psychogalvanic reaction, and tremor of hands, that is to say, all four and more of the essential techniques that have been discussed.

Concluding Statement on Legal Psychology.—Anyone concerned with crime and delinquency wants to know something about the causes. If the causes of unsocial acts are mental disease or mental deficiency, in so far as the law defines the terms, clinical diagnosis determines the treatment. Such problems are discussed in the chapters on abnormal and clinical psychology. Mental disturbance leads to unsocial acts, and in our worst crimes occasionally there exist extreme forms of delusions, as in dementia praecox where social responsibility is lost. It is believed by some psychiatrists that all criminal acts are the product of a mentally disturbed if not a diseased

mind. Low-grade defectives—imbeciles and idiots—lack responsibility for their acts and may commit serious crimes. About 20 per cent of the delinquent and criminal population are mentally defective as contrasted with one per cent for the general population. The mentally disordered and low-grade defectives, who have lost or who never have attained responsibility for social living, are all potential criminals and require institutional care.

If the causes of unsocial acts are not shown to be due to mental disease or mental defect, legal practice considers that the individual is fully responsible for his behavior. However, sociologists have indicated the effect upon crime and delinquency of living in the low privileged areas of large cities. Studies of murderers and other criminals lead to the conclusion that in attitude all feel justified in their ways of living. They believe they are oppressed and hence form their own social code. Specialists of all kinds, working with criminals and delinquents, are unanimous in concluding that most unsocial acts are the product of wrong motivation, improper direction of goals, and the influence of undesirable social suggestion, all of which have their roots in early life and are determined by environment.

CONSUMER PSYCHOLOGY

Consumer psychology is concerned with the responses of people to the ways of marketing of merchandise. All people are consumers at times and the general principles of psychology apply to consumer behavior. Also, there is much known of facts of behavior in specific marketing situations—predicting responses to radio, magazine, and billboard advertising and to different forms of marketing. Often this area of study is referred to as market research or the psychology of advertising and selling.

Principles of Consumer Psychology.—Man as a consumer is motivated, just as is the “organism” of laboratory experiment, by metabolic activity affecting internal receptors. His tissue needs are the original determiners of his “desire to purchase.” They give rise to the drives known as hunger, thirst, cold and warmth, sex excitation, the various pressures of fatigue, exhilaration, and so on. It is

considered good consumer psychology to keep these primitive forces in mind while planning the manufacture and selling of produce.

But most of the desires of the consumer as expressed in the market are highly artificial wants. They have developed with civilized living. The original drives of life are given direction in relation to the many and varied objects of the external world. Stimuli affecting external receptors become the originators of activity. A certain breakfast food or a certain soft drink or cocktail is preferred to another, not because of its satisfaction of thirst or hunger but because of the prestige of its name. Because of this, good will may be expressed to Pepsodent toothpaste, feathers in a hat, Co-op peaches, and resistance to Kolynos toothpaste, high crowns in a hat, and Premiere canned peaches, or any such set of comparisons which are determined in the habitual social patterns of man's behavior. It is often the table linen and not the food with which fault is found in a restaurant, or the name on the wrapper and not the vermicelli it contains. Habits and attitudes of consumption, and their development, are the immediate concern of advertiser and seller.

The Psychology of Personal Selling.—An ingratiating but corpulent businessman selling an electric fan to an unsuspecting Eskimo constituted the idea of the "good salesman" of past generations. Personal selling has its share of "fly by night" ventures even today. But generally speaking, advertising and selling serve the consumer with ideals of truth and honesty in the giving of information.

Personal selling is concerned with the attractive presentation of information about products for sale just as is advertising, but through personal contact. The psychological factors are the same. Only the medium changes. Little is known exactly or scientifically of personal selling procedures. Kitson²⁰ has summarized what psychology contributes by way of general principles. He discusses the stream of mental activity of the consumer in six stages from initial attention to final satisfaction: Attention is gained for a product through varied stimuli and their repetition; interest, or feeling, follows attention and is developed by information and activity aroused toward the prod-

uct; the next step, desire, comes when the consumer seeks the product by actual or incipient behavior; confidence is present when habits of good will are developed; the "psychological moment" of decision and action arrives when instinctive needs and familiar habits are met and rational questions are answered; and the final stage, satisfaction, results in the purchase.

The Sales Interview.—The sales interview is a highly variable method of consumer contact and it may always remain so; the salesman changes his sales methods with the product and with the customer, and these in turn change with the salesman. But there can be developed a standardized interview for many sales situations. McKinney²¹ has subjected the sales interview to psychological measurement. and Mitchell and Burtt²² have attempted to validate current techniques of sales interviewing. Laboratory investigations such as these are highly suggestive of valid field procedures.

Four pairs of contrasting methods were studied by Mitchell and Burtt: (1) Demonstration versus oral elaboration, (2) presentation of facts (long-circuit) versus short-circuit appeals, (3) breezy versus dignified approach, (4) domineering versus friendly approach. A salestalk was delivered according to each of these eight approaches by a trained salesman to forty college students who were asked to rate the salestalk on a five-point graphic scale. Results indicated that the demonstration method was considerably superior to elaboration. Presentation of facts was better than the short-circuit method. The friendly approach was favored over the domineering approach. The average differences in ratings between these paired methods were statistically significant. Some of the 40 "prospects" favored the breezy approach and some the dignified approach, which suggests that here we have a question of individual preference.

Psychology of Advertising.—Advertising receives an enormous amount of study to determine its value as a medium of contact with the consumer. Appeal value is measured in attention, recognition, recall, brand of last purchase, and so on. Measurement may be by either laboratory or field investigations. Through field study

the final effect of all advertising on the consumer is determined. Laboratory studies are particularly useful in suggesting the value of related content and form of advertisements in advance of launching an advertising campaign with its accompanying cost. From the study of past advertising information is gained of existing procedures.

Historical Method.—Early investigators measured the amount and size of advertising in various media. For example, Scott and Starch²³ found that the size of advertisements in the Century Magazine—as indicated by the number of agate lines—increased steadily and more than fourfold from 1872 to 1913. Gaudet and Zients²⁴ showed that the use of the full-page advertisement in the Literary Digest increased rapidly from 1910 to 1918 and thereafter remained stable until 1932 at about 50 per cent of the total advertising. These results may be evidences of business competition and are of little if any value in determining the psychological factors operating in advertising.

Psychological Methods of Investigating Advertising.—Methods in present use for investigating the psychological influences of advertising include (1) the psychometric scaling methods for measurement of the attention value of advertising copy, (2) recall and recognition tests of its memory value, (3) field questionnaires or inventories, and (4) consumer interviewing.

The Psychometric Scaling Methods.—The three psychometric scaling methods of the laboratory—the *order-of-merit method*, the *method of single stimuli*, and the *method of paired comparisons*—are used in the estimation of the appeal of advertising where comparisons can be made between separate advertisements. These three methods have been examined for their relative merits. Barrett²⁵ reported an average correlation of .987 between the order-of-merit method and the method of paired comparisons for judgments of weights, specimens of handwriting, and propositions of belief. The two methods give equal results and the order-of-merit method is far less time-consuming, which accounts for the neglect of the method of paired

comparisons in the estimation of advertising. After reporting a correlation of .55 between the method of single stimuli and the order-of-merit method in the judgment of jokes, Conklin and Sutherland²⁶ concluded that the method of single stimuli secured the more direct estimates of preference. Circumstances will determine which method shall be used in the investigation of advertising appeal, but the method of single stimuli has the widest application in all practical problems of psychology, including those of advertising.

Measuring the Memory Value of Advertising.—Recall and recognition tests correlate with very low coefficients. Achilles²⁷ reported an average correlation for adult groups of .23 and for child groups of .21 between tests of recognition and of recall. Recall and recognition have distinct uses in marketing and they must be investigated separately.

Likewise, measures of aided recall, where the method of paired associates is used, and of unaided (pure) recall, where advertisements are reproduced without assistance, do not correlate highly. Brandt²⁸ compared the memory value for trade names by these two methods and reported a coefficient of .53. Memory for advertising will differ according to the form of its expression.

In tests of recall by the method of paired associates the kind of the product is given and the company name of its advertisement must be supplied, for example, vacuum cleaner—Hoover. The method of paired associates has been developed by Link²⁹ so that two associates may be presented and the subject is tested for a third, which Link calls the "method of triple associates." He believes that this form of testing aided recall has practical advantages, because of the use in advertising of vehicles or themes to carry an idea of the utility or attractiveness of the product, for example, the theme of Texaco gasoline is "Firechief."

The Field Questionnaire.—Consumer questionnaires consist of carefully-worded questions upon radio programs, packages or containers, the product and its vehicles of advertising, which are framed in a manner to interest the consumer and elicit if possible the infor-

mation desired. Various forms of recall and recognition tests may be included in a questionnaire. Return coupons attached to advertisements often have questions of the sales program as their purpose. The questionnaire is mailed to a sample group of consumers which is selected to represent a certain territory or economic level of the population. Returns are usually unsatisfactory, which reduces the reliability of results. Generally speaking, the questionnaire is not a highly effective method in consumer psychology.

The Consumer Interview.—Consumer interviewing is an improved technique for field studies where trained interviewers telephone or visit the consumer and secure similar information to that usually requested in the questionnaire. While the method involves a greater initial expense than the questionnaire, it determines with a high degree of exactness the effect of advertising when adequate sampling is provided.

Sampling is usually by socio-economic levels, corrected for educational levels and geographic area. The population may be divided into A, B, C, and D buying groups, representing homes of four economic levels. Neighborhoods are selected as sub-samples for these home-groups in communities throughout the total population area. Housewives or heads of families are interviewed at their door or by telephone. Interviewers are trained for the task. They work under supervision. There are checks on their accuracy. A sufficient number of interviews is obtained from each socio-economic level and geographic area to maintain statistical reliability for important influences in sub-samples.

Interview Reliability.—Jenkins³⁰ has measured the reliability of the interview of last purchase for 19 products over 48 hours by a repeat interview on the excuse that the interviewer of the previous day had lost his records. A reliability index of 90 per cent was reported, with an average deviation of 1.8 per cent for the 19 commodities, showing uniformity between products. Considering that some individuals in the sample might have made purchases of different brands during the time elapsing between the two interviews, 90 per

cent reliability of the consumer interview may be considered as exceedingly high.

Interview Validity.—Likewise Jenkins and Corbin³¹ have measured the validity of the interview of last purchase for thirteen products by asking the interviewee to give the store of purchase and verifying it. A validity index of 77.5 per cent with an average deviation of 10.4 per cent was reported for the thirteen products. This validity index means that the interviewee named as his most recent purchase the brand of the product actually shown on the sales slip of the store in which he said he purchased it. Probably this estimate is reduced by housewives having made their most recent purchase at a store other than the one indicated—an error in naming the correct store. But this measured validity of the interview is judged to be satisfactory for practical purposes although it varies considerably for different products.

Typical Results of Laboratory Studies of Advertising.—

Numerous dimensions or cues in sensitivity have been investigated to determine their influence upon the appeal or memory value of advertising copy, such as color, size, repetition, motion, isolation, brightness, contrast, and so on. Some of the results of laboratory investigations concerned with these factors will be reviewed here. Such investigations offer the information necessary for selection of content and form in the make-up of advertising. But they do not predict the final effect on the consumer where the advertising is in relation to all other influences affecting him.

Attention value does not increase proportionately with size or space. Rather, attention values conform to a square-root relationship for different areas. Nixon³² measured attention value as the time spent in visual fixation of half- and full-page advertisements. The attention value of the half-page to the full-page was 75 per cent, which is very close to the value for the square-root relationship between these areas. Similar results are reported by other investigators, but there has been some controversy over this point. While large sizes have greater attention value, additional area alone does not compensate for increased cost.

Likewise, laboratory studies of color in advertising do not indicate that color alone has as great attention value as has been attributed to it. Also, color preferences are highly variable, and there are no colors that are universally preferred to the extent necessary that they and not others be included in advertising.

Contrast of color brightness and saturation between foreground and background in advertising is more important for attention value. Likewise with size contrast. Pedestrians will pause more frequently before a highly illuminated show window than one less illuminated. Motion in window display increases the number stopping to look.

Familiar contrasts are often less effective in any form of stunt advertising. In habitual activities, however, this is not true, as is illustrated in an experiment by Paterson and Tinker³³ who measured the effect in speed of reading upon reversing the familiar contrast of black on white of the printed page. Black on white was more legible than white on black, and the investigators advise that whenever white on black is used as a device to attract attention in advertising the amount of reading text be limited to a minimum.

Habitual behavior is always an influence to be taken into consideration. The attention value of the upper left corner of the flat page is greatest; and right pages are superior to left pages for advertising because of habitual reactions in reading. Preferred pages are near the beginning and the end of advertising sections of magazines. It is interesting in this connection to find that advertising of competing products does not decrease the attention value of them in related space.

The conditions under which advertising is read should determine its make-up. Lucas³⁴ shows that length of headlines does not influence their recall when read at the person's own rate, but when the reader is pushed for time their length does determine their recall. It might be concluded from this that advertising in magazines and papers read at leisure could make use of much longer headlines than those read in the rush hours of the day.

Specific determiners of appeal value are not the rule in advertising, as has been indicated. Pictures, color, size, type, and so on, may be important, but their relationships are more influential in

determining the appeal and memory value of an advertisement. Strong³⁵ shows that attention value increases more rapidly than the additional cost of the increase when white space is added up to 60 per cent of the total advertisement, but thereafter white space is relatively less important. Just as these factors in advertising make-up are mutually dependent in determining appeal and memory value, so it is to be expected that any advertisement or advertising will be influenced by its surroundings. Only field studies can determine the ultimate effect on the consumer.

Laboratory Studies of Radio Advertising.—Radio advertising differs from magazine and newspaper advertising because of its medium of auditory presentation and because of the related memory value of the accompanying program. For this reason radio advertising is a distinct problem for both laboratory and field study. Stanton³⁶ has measured the relative effectiveness of auditory and visual media by presenting fictitious advertising statements, consisting of 75 words for each advertisement, to be read (visual presentation) and listened to from a loud speaker (auditory presentation). Separate groups were tested for trade names given in the copy after one day, seven days, and twenty-one days. The auditory presentation was significantly superior when measured both by unaided recall and aided recall. The peak of superiority for the auditory presentation was on the seventh day. For recognition, however, there were no significant differences between the two forms of presentation, although the tests on all days were slightly in favor of the auditory presentation.

Here are positive results favoring the auditory presentation of the radio for recall of the advertising. But there exists a great deal of conflicting evidence upon the relative effectiveness of the auditory and visual presentation in the educational classroom. The usual conclusion is that children learn best from auditory instruction and adults from visual instruction. Undoubtedly the radio situation differs in its motivation from that of the classroom. Any conclusion upon this point at present must be considered tentative.

Typical Results of Field Studies of Advertising.—Differential effects of advertising are demonstrated over and over again by field studies. Link ²⁹ has reported the results of an extensive field study conducted by the representatives of the Psychological Corporation throughout the United States. Housewives in 14 cities were interviewed by the triple associates method to determine the recall value of advertising. Twenty-seven firms were distributed in these results from 69.1 per cent for Chase and Sanborn, in answer to the question, "What coffee advertises: 'Look for the Date on the Can'?", to 3.8 per cent for Johns-Manville, in answer to the question, "What building company advertises, 'I smell smoke'?" Repeating the test on various dates gave results for Chase and Sanborn, as follows:

<i>Date</i>	<i>Mar. '32</i>	<i>Sept. '32</i>	<i>Oct. '32</i>	<i>Dec. '32</i>	<i>Feb. '32</i>
No. of Cities	14	18	47	43	39
No. of Housewives ...	1578	541	1445	1956	1399
Per Cent Correct	69.1	66.8	71.0	75.6	74.1

The increase at December '32 coincided with the introduction of a leading performer in the radio program of this company.

Radio Advertising.—The entertainment program of the radio has association value for the product advertised, and field studies of radio advertising are concerned with its appeal as well as that of the advertising accompanying it. An investigation reported by Gaskill and Holcomb ³⁷ illustrates a technique for establishing the validity of field measures of radio advertising. These investigators distributed a questionnaire to a sample of listeners of sponsored broadcasts consisting of a specially prepared recognition test of the multiple-choice variety and including ten questions upon each broadcast but with five of these questions on the advertising and five on the program. (Two alternate forms of the test give split-half reliability coefficients on 350 cases of .89 and .70.)

Scores in this test were computed as the per cent correct response for program and for advertising, thus giving two scores for each broadcast. Corrections for relative amount of time spent on the

air were applied by dividing the average score for program and for advertising by the number of quarter hours of the weekly broadcast. Corrections for the relative amounts of time consumed by the advertising part of the program for the separate broadcasts—assuming that effectiveness of advertising is directly proportional to the time spent in presentation of the advertising—were made by dividing the advertising scores by this time. Corrections for influence of amount of newspaper and magazine advertising—on the assumption that this is an unequal influence upon the memory value of the advertising—were made by dividing the advertising scores of the broadcasts by the amounts of such advertising computed for a definite period. Program and advertising scores were equated for comparison of total broadcasts by setting the highest average score for program and for advertising at 100 per cent and multiplying the average scores of the other broadcasts by $\frac{100}{x}$, where “x” is the average score of the broadcast adopted as 100 per cent.

In this manner, Gaskill and Holcomb compared five national sponsored broadcasts, each advertising one product for the State of Iowa. Results showed that the average memory value of the program content was higher than that of the advertising. There was no relation between the amount of time used in presentation of the advertising and its memory value. But its memory value was affected by ingenious “sandwiching in” of advertising announcements. The complete isolation from the program of the advertising announcement as an introduction or conclusion had low memory value. Amount of newspaper and magazine advertising had a negligible influence on memory of the broadcasted advertising.

Buyer Trends.—Studies are made of buyer trends in advertised goods usually by means of repeated interview samples over lengthy periods of time. Henry Link of the Psychological Corporation established in 1932 a service for manufacturers, called the “Psychological Brand Barometer,” which estimates the number of buyers and the relative percentages of customers for competing products or competing types of products. In this manner, the effect on the consumer could be determined for varied amounts and kinds of advertising.

averages of bimonthly interviews reporting purchases and the broken line represents annual percentage totals of actual sales. The interviews reporting purchases predict to high degree what shortly will appear in the sales records of retail stores, in distribution records somewhat later, and in manufacturer's records after a considerable delay. Psychological Barometer readings, made several months in advance, are reported as having an accuracy within one per cent of actual sales records.

At the bottom of Fig. 30 II will be found a comparison of trends of purchases as reported in six annual samples of 10,000 and 5,000 interviews for three types of dentifrice—paste, powder, and liquid. From such information as this the manufacturer plans production and distribution and interprets policy for future development.

Concluding Statement on Consumer Psychology.—The foregoing provides an introduction to the problems and techniques of consumer psychology. More complete surveys of the area will be found in texts on this subject.³⁹

The area of consumer psychology has become subdivided into a number of business specialties in which the techniques vary according to the marketing situation.⁴⁰ This work is frequently referred to as consumer research or the commercial survey. It is concerned with such problems as the description of the market which defines for the manufacturer what products and how much can be sold. It investigates public preferences as to the form of the product. It studies the problems of packaging. It determines what is preferred in editorial policy of magazines. It measures public attitudes toward industrial policy as a problem of public relations. It assembles necessary information for the development of an advertising campaign. It provides a test of advertising copy. It checks upon readership of publications or listeners over the radio. All these, and many more, are the services rendered to industry and business by consumer psychology.

THE PUBLIC OPINION POLL

The public-opinion poll uses essentially the same methods in surveying attitudes toward various social and political issues as

does market research in determining the buying habits of consumers. The most successful procedure in all such problems has been that of interviewing representative samples of the public.

Uses of Opinion Polls.—Opinion polls are used to determine public attitude toward the policies of industrial concerns, such as measuring the effect of their public educational programs concerning industrial expansion and labor relations. They are used to determine the effect of events on public attitude and to establish what is current public attitude. They are used to determine the public reaction to such government programs as soil conservation, anti-inflationary measures, rationing and consumer wants. Morale surveys are made of the opinions of soldiers and officers of the Army, and of industrial workers. The attitudes of readers of publications are polled. Last, but not least in importance, political-opinion polls are run periodically at times of political campaigns to measure the effect of political speeches and to determine trends in public opinion toward the candidates.

Numerous organizations specialize in the various areas of opinion measurement, and a current statement of their work will be found in the book listed at the conclusion of this chapter entitled, "How to Conduct Consumer and Opinion Research," edited by Albert A. Blankenship.⁴⁰

Political Opinion Polls.—The polling of political opinion dates back to the early twenties when newspaper editors attempted to predict by straw votes the outcome of an election. Polling opinion with research technique began with the organization of three polling organizations in 1936, headed by three familiar personalities, Archibald Crossley, George Gallup, and Elmo Roper, who started out to predict the national election of the year.

The essential stock-in-trade of their organization was knowledge of population sampling, and it is sampling technique primarily that makes it possible to get a reliable answer to the question of what are popular attitudes and opinions. With a sample of 3500 properly selected interviews it was possible for Roper to forecast the results

of the 1936 national presidential election with not more than one per cent error.

Public Opinion Research.—The public-opinion poll is a measure of attitude, but attitude which is highly structured so that differences in opinion are clear-cut and recognizable to most people when the statement of these differences is placed before them. Morale, opinions about social issues, and political attitudes can be measured by polling techniques where the thinking of the respondent is clearly defined upon the issue.

Technical Problems.—There are many technical difficulties as yet unsolved in public-opinion polling and many that have been solved. Cantril ⁴¹ and his associates in the Office of Public Opinion Research at Princeton has performed various experiments upon the wording of the question. They conclude that the open answer question has great value in determining what opinions do exist, that the dichotomous, yes—no, question is most valuable where the issue is clearly defined, and that the multiple-choice type of question is desirable where one or both sides of a clearly defined issue have several possibilities. The split-ballot technique, where the same question is asked two groups with differing wording, has been used by Cantril as a check on reliability of the question.

Determiners of Public Opinion.—Cantril ⁴¹ has gone to considerable effort to segregate the important factors determining public opinion or causing people to hold common opinions. The influence of such factors on opinion as age, sex, religion, race, nationality, amount of information, level of education, and socio-economic status has been measured, with the general result that the kind of issue involved must be considered in weighing such influences. The amount of information does not readily affect opinion if education and socio-economic status are constant. Events are the stronger determiners of opinion. Education is an influence upon opinions where insight is required into consequences. Political decisions are determined more by socio-economic status than otherwise. Education enables those of higher economic status to see more clearly where

their self-interest lies. Education and socio-economic level are considered to be the more likely influences of public opinion or attitude, although any of the above factors may exert an influence in a particular social situation.

Concluding Statement on Opinion Polling.—Careful scientific sampling is generally used in public-opinion polling, but this does not mean that sampling technique cannot be improved. This was the critical issue in predicting the 1948 presidential election where polling organizations limited samples to reduce costs. The method of interviewing used bears up under repeated tests as an accurate method of getting facts, if certain influences, largely known, are controlled. But this method may wear out in public acceptance with repeated use, and polling organizations are searching for new methods of observation of attitude.

The way in which results of public-opinion polls are used, such as the publication policy of polling organizations, is a social question of importance as is the use to which market-research results are put. Studies have been made of this social question and particularly of the "bandwagon effect" of publishing the results of political-opinion polls. This was evidently the main issue in the Congressional Investigation of the American Institute of Public Opinion following the 1944 election.

The correct answer to the question of the social value of opinion polling would seem to be that where facts can be presented accurately on any question—political, economic, war, health, religious, social—the public is entitled to have these facts. In so far as the political-opinion poll is concerned, the individual voter is entitled to know what others are thinking about the various political candidates just as he is entitled to know the platform of those candidates.

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CHAPTER XIX

PHYSIOLOGICAL PSYCHOLOGY

By G. L. FREEMAN, *Cornell University*

GENERAL ORIENTATION

Psychology, in most of its branches, studies the activities of human (and subhuman) beings as *total* organisms. Occasionally behavior is analyzed into some simple components, such as reflexes, but attention is generally centered on the person as a whole—a compact, integrated biological unit reacting to its external environment in various ways. Useful as these total appraisals may be, we also need to know how particular parts of the body function in behavior. Students of medicine and other biological sciences, who are especially interested in this question, turn for an answer to *physiological psychology, a field which takes as its problem the relationship of integrated behavior to the various bodily mechanisms.*

The anatomy and physiology of sense organs, nerves, glands, and muscles contribute to an understanding of man-as-a-whole, since breakdown of a total function is almost invariably due to breakdown in the action of some part. Behind the relatively simple front of each overt action lies a background of great complexity. The attempts of the physiological psychologist to unravel the mysteries of this background can be compared with the efforts of a mechanically-minded individual to understand the workings of an automobile. In each case much has to be mastered that is only indirectly related to the action of the total machine. One must be able to appreciate the principles of internal gas combustion, gear reduction, and friction loss before the workings of the automobile become clear. So the physiological psychologist needs to attain a thorough understanding of bodily structures and functions before attempting his examination of behavior mechanisms. But this is not the full extent of his task. Knowledge which comes from the study of body parts in isolation

does not satisfactorily explain the more complicated forms of behavior. The facts and theories developed from such work must be tested experimentally for their application to the operation of the intact organism. And, since parts often act differently together than when taken apart, *integration* becomes the major problem of physiological psychology.

Psychological Function and Bodily Structure.—No exact correspondence may be expected between psychological function and bodily structure. There are several reasons for this. In the first place, a psychological function always involves a number of bodily parts, and even such a relatively simple act as seeing a green light depends upon an elaborate chain of events in the retina, the brain, and the eye muscles. In the second place, a given bodily part is capable of contributing to several different psychological activities, as when the arm muscles respond reflexly to a painful stimulus or contract slightly when the person imagines he is hammering a nail; and, while certain structures are more important to one type of activity than are others, to speak of the brain as the 'seat of consciousness' and of the glands as the 'basis of emotion' is an unwarranted simplification of the idea. Finally, a number of bodily structures are yet without well-defined functions, and many psychological disorders have no known organic basis.

Fully aware of these limitations, the physiological psychologist leaves the writing of a definitive physiology of emotion, learning, and other activities until such time as their psychological analyses are more adequate and the methods of bodily correlation are more refined. By setting out first to understand the bodily mechanisms themselves and second to apply that knowledge to activities of the total organism, he is more likely to arrive at basic principles than if he begins with psychological functions first and proceeds to hypothetical, unsubstantiated, and inept physiological explanations. It is very significant that so many positive statements made about the bodily mechanisms involved in performance have turned out to be untrue! Consequently we are here concerned mainly with certain physiological processes known to govern integrated behavior and with the contributions of different bodily structures to these processes.

The Energetics of Activity.—The human organism may be regarded as an engine specifically designed for changing energy from one form to another. Energy is received from the foods that we eat and from the stimuli that fall upon our sense organs. Energy is released in our performances, which vary all the way from involuntary startle to a noise, to solving a problem in higher mathematics. The energy transformation or turnover that takes place when we react to stimuli is known as work, and our efficiency, like that of other machines, can be measured by dividing our work output by our energy input.

Why is it that energy is received by the human machine in two different forms and given out in only one? Or, to state the question another way, if all energy outgo involves reactions to incoming stimulus energies, what is the function of food? To understand this we must realize that the human organism is not a truly inert machine, to be set into motion by the application of energy sources distinct from itself. External stimuli, such as the air vibrations producing hearing, serve mainly as 'trigger charges' to release food energies already stored in the bodily tissues. The economy of the human body is organized around two complementary systems: (a) The digestive-circulatory system, and (b) the neuromuscular system. As indicated in Fig. 31, food energies are changed by the digestive system into a concentrated type of fuel which is made easily available by the circulatory system to tissues of the neuromuscular system; the external-stimulus source touches off the fuels stored in the neuromuscular system and a response is made.

Since these two systems tend to act as a unit, the key to the *why* of organic response is to be found more in the complicated energy exchanges going on within the body tissues than in the work of outside stimulus energies acting upon them. The sight of water does not lead a man to drink unless he is thirsty, and a certain physiological state must be operating before the mere presence of a mate leads an animal to make sexual advances. It is a fundamental biological fact that the behavior of all living organisms tends to be self-regulatory and not that of a robot, controlled by the external promptings of a fortuitous and changing environment. This self-regulation in-

volves (1) basic tissue conditions which upon reaching states of excess or deficiency give rise to internal stimulations and so excite the organism to general activity, and (2) mechanisms of overt reaction which are potentially able to secure stimuli which will return the internal tissue conditions to a more 'normal' state and hence restore the equilibrium of the entire apparatus. In the absence of food or mate, activities appear which tend to provide them. Such reactions

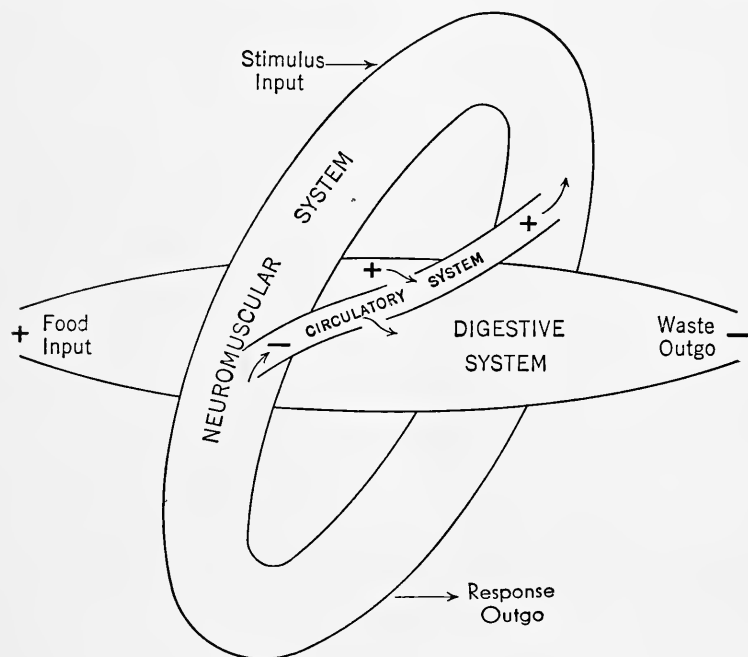


FIG. 31.—The Plan of the Body.

are of direct and immediate value to the organism as equilibration of basic inner tensions. So too are the more remotely conditioned outlets in which much apparently purposeless activity in children eventually finds specific expression.

The physiological psychologist's interest in the energetics of activity builds around the question of *energy sources* and of *control mechanisms* which direct the spontaneous activity thereby aroused. Studies showing that 'hunger' contractions of the stomach coincide

with periods of heightened general activity have indicated the importance of the digestive-circulatory system as a source of energy; and experimental removal and implantation of the several endocrine glands have contributed greatly to our knowledge of more diffuse energizing phenomena—in which the tissue “need” does not lead so directly to overt behavior, but manifests itself mainly in raised metabolism and reactivity of other bodily tissues. In the matter of control mechanisms, it is fairly certain that the “spontaneous” activities aroused by tissue demands are rather nonspecific, being supplied with a minimum of internal “steer” or direction. The digestive-circulatory system is much better adapted for conserving existing bodily energies than for acquiring or avoiding new stimulus energies which are beneficial or harmful to continued organic function. The latter need is supplied by the neuromuscular overlay apparatus, whose chief characteristic is a maximum capacity for change or modification of behavior in the most appropriate direction. Thus, whenever the digestive-circulatory system is disturbed or forced into a state of disequilibrium through the absence of basic tissue needs, such as the need for food, it sets up a nonspecific compulsion of the superposed neuromuscular system to so adjust the organism in the environment as to acquire stimuli which have the capacity to produce more or less adequate readjustment in the basic system. Since environment is ever-changing, it is obvious that great functional plasticity must be the chief characteristic of the neuromuscular apparatus.

The Neuromuscular Apparatus.—The neuromuscular apparatus is not a homogeneous affair, but is organized in relation to a threefold plan; these divisions are the *sensory receptors*, the *central (brain) adjustors*, and the *motor effectors* (see Fig. 32).

External stimuli act on receptor organs; the energy released by these structures supplies the charge which excites the central adjusting neurones; and these nerve cells, in turn, discharge upon some motor outlet or effector organ which develops the overt response. A cross-sectional view of the neuromuscular apparatus at any moment would show a vast number of nerve discharges passing from receptors of the eye, ear, and skin to the brain and spinal centers of the central nervous system, and an equally vast number of discharges passing

from these adjustor nerves to the effector organs, the muscles and glands. These nerve discharges are electrochemical phenomena which accompany energy transformation in nerve cells, and their detection by delicate electrical amplifying devices serves to tell us what parts of the neuromuscular apparatus are doing work. Nerve discharges of external origin are not generally chained directly through a stereo-

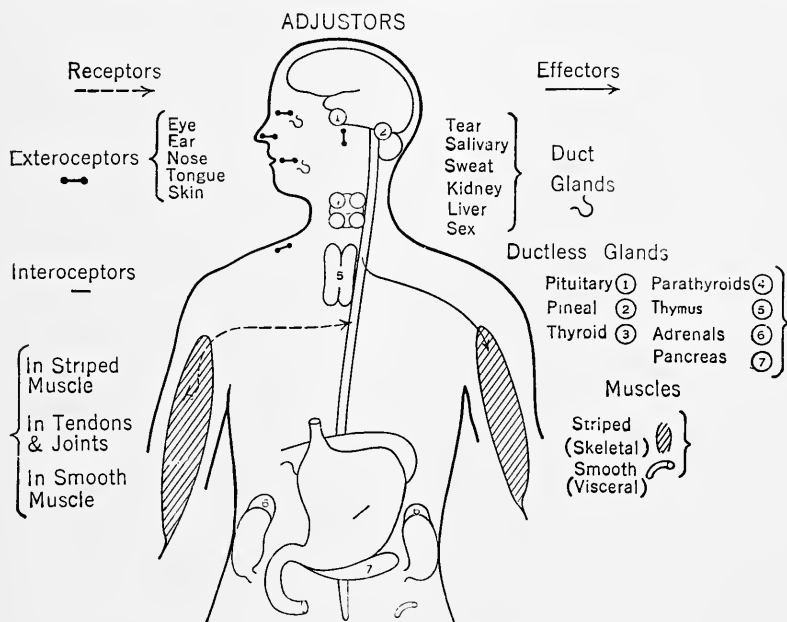


FIG. 32.—NEUROMUSCULAR APPARATUS.

Different symbols are used for each type of organ to indicate its approximate location. Only the ductless glands are numbered for specific identification. Glands are properly classed along with muscles as effector organs because of their motor functions.

typed circuit to a particular motor outlet. Instead, such discharges on reaching the adjustor centers have to be integrated or made to fit with excitation of internal origin before the discharge leading to appropriate motor response is released. In this way the integrity of the total apparatus is preserved; and much incongruous and harmful behavior is avoided, such as removing an irritating stimulus from the back of the neck when one's arms are already engaged in keeping the body from falling out of a tree.

Methods of Investigation.—Many different techniques are used by physiological psychologists in the study of behavior mechanisms. Where the problem is largely that of determining the functional contributions made by some particular part of the neuromuscular apparatus, that part may be removed and behavior changes after extirpation compared with those which held prior to the lesion; or the part may be *stimulated* electrically and concomitant changes in behavior noted. Sometimes the problem is to find the major adjustor centers involved in a given performance, and here the activity in question is initiated while various brain structures are explored for *electrical signs of heightened activity*. These three methods are largely limited to animal experimentation; and many difficulties arise from trying to “homologize” or relate the connections found between structure and function with analogous activity in man. Correlations between behavior changes and *pathological lesions* are often helpful, as in the connection between speech loss, or aphasia, and the locus of brain tumors. An even more fruitful method takes various *peripheral indicators of central function* such as blood pressure, galvanic skin resistance, or electrical “waves” from the brain, and studies changes occurring in them during performance of the intact human organism. Since such physiological reactions are extremely sensitive and not under voluntary control, they are of great diagnostic value, as with the use of blood-pressure changes in the detection of guilt or brain-wave records to warn of impending epileptic seizures.

From this brief overview, it appears that physiological psychology has important practical bearings and is, at the same time, a very complicated field of study. Those specializing in it must be rather versatile persons, mastering many difficult techniques and having a considerable background of anatomical and physiological detail in order to interpret their results. In the sections which follow we shall see specific applications of the various methods to the study of the gross divisions of the neuromuscular apparatus

SENSORY FUNCTIONS

By virtue of the place which they hold in the threefold plan of neuromuscular action, *receptor mechanisms are primarily concerned*

with the initiation of behavior. With the exception of the cases of muscle and gland excitation by *autocoid* substances in the blood stream, man reacts only to energy changes affecting his sense organs. These influences or stimuli give qualitatively different effects, such as red, green, pressure and pain, and quantitative changes such as in intensity and in duration. The physiological psychologist is especially interested in how these two different aspects of sensory function are related to the activity of the receptor organs. These structures are specifically differentiated cells with low thresholds of excitation for certain kinds of stimuli (called "adequate") and high thresholds for all other energy manifestations. They either exist as more or less independent units distributed throughout body tissues, as in the skin, or are collected together in elaborate sense organs, which possess in addition to the specially sensitized tissue a number of accessory parts adapted to concentrate particular kinds of stimulus energy thereon, as in the eye and the ear. Receptors are divided into two great classes, depending upon their adequate stimuli. (1) The *exteroceptors* are a part of the body surface; they include the eye, ear, nose, tongue, and skin, and react to stimuli in the external environment. (2) The *interoceptors* are embedded in the inner body tissues, especially the muscles and digestive organs, and react to pressure stimuli arising from the activity of these parts, that is, the internal environment.

Qualitative Variations.—Much speculation has been aroused concerning the relationship between the various receptor structures and the different qualitative experiences or sensations. According to a now discarded view, nerves from the eye, ear, etc., carried a different type of discharge or specific nerve energy. We know today that all nerves that convey excitation from receptors to the central nervous system behave in approximately the same manner, and the fact that each sensory nerve arouses a special type of response is determined largely by the kind of tissue with which that nerve connects. This means that if it were possible to attach the optic nerve to the ear and the auditory nerve to the eye, we might be able, as has been said, "to see the thunder and hear the lightning."

Search for the origin of the various sensory qualities in the terminal receptor and brain cells of the sensory circuit has given rise

to a controversy of wide implication. The most common view supposes that specialized receptor structures exist for each quality in a given sense modality, and that the analysis is, therefore, *peripheral*. An alternative notion is that the receptor structures in a given sense organ, such as the eye, are largely alike, and that the total pattern of stimulation is sent forward to the brain for "*central*" analysis. The classic example of the specialized receptor theory is one which suggests that the different receptor structures in the skin respond exclusively to one type of stimulus—one for warm, another for cold, etc. Direct correlation studies have shown, however, no specialized receptors under any warm or cold spots of the skin—only free nerve endings and afferent fibers in blood vessels; and recent work on the differential effect of warm and cold stimuli upon these undifferentiated end organs suggests the importance of central brain processes in the analysis of sensation. In the field of hearing, where the specialized receptor theories are also more traditional, study of the electrical responses of the auditory nerve lends some support to a theory of central analysis. Even in the field of vision, where either specialized structures or qualitatively different photochemical substances in the eye have always been proposed as the basis for the sensations of red, green, etc., the importance of central brain factors begins to be recognized. It is, of course, too early to state in any one of these fields the relative importance of receptor and brain cells in the qualitative analysis of sensory functions; but it is certain that this domain should provide a veritable bonanza for any research worker with a fruitful imagination and equipment for refined physiological investigation.

Quantitative Variations.—Much more is known concerning quantitative variations in sensory functions. These have to do with the amount of inertia of the receptor and time relations in the associated nerve discharge. According to the *all-or-nothing law*, each receptor has a quantity of energy ready for discharge, and any stimulus that is of sufficient intensity to overcome the "threshold" inertia of the receptor and touch off that energy, discharges the whole of it. Increments in stimulus intensity, if registered in the brain,

would, therefore, represent the involvement of more receptors. There would also be increased frequency of discharge for each receptor, since stronger stimuli excite the nerve earlier in its resting or refractory period.

Since the number of receptors in any given sense organ is limited, the questions of gradations in response becomes an important one. From the time of Weber and Fechner it has been known that the minimum increase in stimulus intensity necessary to be sensed as just perceptible, becomes progressively greater as one proceeds from low to high intensity. The logarithmic increase in the frequency of nervous discharge found to accompany equal stimulus increments correlates with the first observation and means that most of our receptors are sensitized to respond to the lower range of intensities. When the stimulus is more intense the receptive apparatus is relatively unresponsive, having few units which remain to be discharged by the added increment.

The duration of a stimulus as well as its intensity affects the receptor mechanism, and under prolonged activation the receptor loses its excitability. This is known as *sensory adaptation* and depends upon the fact that receptors and their associated nerve fibers respond at different rates to the same external energy charge. The receptor loses its excitability very slowly, while the associated nerve responds, rests, and responds again many times before the receptor itself rests. The receptor thus operates after the fashion of an electrical interrupter in changing a continuous stimulus into a series of discontinuous nerve discharges, between the passage of which the nerve cell is able to recover its excitability. Of course if the nerve cell were stimulated sufficiently long, it would be excited earlier and earlier in the *refractory period* when it is supposed to rest, and would ultimately be entirely exhausted. But before this great physiological impairment occurs, the receptor will itself have become inactive and no further stimulus effect will be transmitted to the sensory nerve and other parts of the central nervous system. This buffer action of the receptor in sensory adaptation actually protects the brain cells from possible fatigue effects brought on by prolonged external stimulation.

MOTOR FUNCTIONS

Effector structures are specialized types of cells that react in specific ways to nerve discharges conveyed by receptor and adjustor units. All have a relation to the general function of motility. The *striped* or skeletal muscles move the body framework about in the environmental field. The *smooth* muscles of the hollow viscera (stomach, intestines, blood vessels) contract and relax to maintain the steady flow of fuel energies throughout the body, and the *duct glands* (tear, salivary, sweat) provide essential substances for the same end. Secretions of the *ductless* or endocrine glands pass directly through the gland cell walls into the blood stream, where they are carried to other parts of the body, raising and lowering their activity. Physiological psychology has two general problems connected with the action of these effector mechanisms, the muscles and glands. One is to classify all the specific mechanisms of overt adjustments. The other is to determine what backlash influence effector activities have upon other parts of the neuromuscular apparatus.

We have already seen that man is no mere touch-and-go mechanism, turning external "stimuli" into external "responses." Muscles and glands, besides serving to effect specific adjustments which will favorably modify the organism's relation to the external environment, act to sustain and energize the rest of the reaction apparatus. For purposes of discussion, we shall classify functions of the first type as *phasic reactions*, and functions of the second type as *tonic reactions*. The phasic response is of short duration and usually represents a temporary adjustment to some momentary and fleeting stimulus, as in the reflex withdrawal of the hand from a heated object. The tonic response represents a more enduring but less specific adjustment calculated to sustain a certain continuity in the organism's conduct by supporting appropriate phasic responses, as in the general postural alertness which accompanies unexpected contact with a harmful environmental stimulus. Phasic acts of a voluntary or reflex nature occur only when the muscles are in a state of slight tension, and these same tonic activities by supplying a major share of backlash excitation to the brain cells are largely responsible for their lowered

thresholds to sensory excitation during waking activity. Since practically all effector organs have both phasic and tonic functions, it is hard to assign each type of reaction exclusively to a given class of effectors. On the other hand, it can be said that tonic bodily trends of alertness or lassitude are largely influenced by the activity of the ductless or endocrine glands and by the maintained states of slight muscular tension, while the more intense and shortlived contractions of skeletal muscle and the secretions of the duct glands contribute little to tonic functions. Attempts at more precise distinctions stress the evidence for two different kinds of muscle tissue, differences in central adjustor control and differences in sources of sensory stimulation. But until there is more general agreement on these points, we may think of all effector mechanisms as potentially capable of phasic and tonic reaction. And while it is often difficult to segregate the two, every motor adjustment gives some indication of the mutual contributions of activity specifically directed toward the source of stimulation and of widespread supporting postural adjustments.

Phasic Reactions.—Qualitatively different phasic reactions, including the many exact adjustment mechanisms for maintaining balance, grasping objects, or rejecting harmful substances from the digestive tract, cannot be adequately surveyed in our limited space. Instead we will confine ourselves to certain quantitative variations common in all such responses. When a muscle or gland is stimulated by a mass discharge of energy over its associated motor nerves, it reacts suddenly, thereby causing an overt movement, or secretion of some glandular product. In the case of muscles, at least, response is roughly graded to stimulus intensity in accordance with the all-or-nothing law. If the stimulation is continued for a long time, progressive decrements in response appear. This is usually referred to as fatigue, though an equally appropriate term would be *motor adaptation*. The primary cause for the loss of muscular responsiveness is the rapid accumulation of split waste products, especially at the point of junction between nerve and muscle. Like all cells of the body, muscle fibers are able to carry on work by burning up certain fuels, which they manufacture from foods carried to them by the blood. When motor activity occurs too frequently, as in continued electrical

stimulation of a frog's muscle over its associated motor nerve, the rate at which fuel molecules are split up by the activity exceeds the rate at which they are burned by the oxygen of the blood stream, and the toxic substances resulting from this partial combustion accumulate on the muscle and literally foul its connection with the central nervous system. This "fuse plug" arrangement operates to cut off the stimulus to continued action before the muscle fibers are seriously impaired and, during rest, when waste products are being removed and new fuels supplied, the muscle recovers its irritability.

Because much of man's work also shows decreased output with time, many psychologists have tried to explain this phenomenon on the same basis as the fatigue effects found in the nerve-muscle experiment with the frog. It is known, however, that in such work as prolonged mathematical activity, a man may show decreased output without true motor fatigue, and that true fatigue is often present without decrement of output. The latter situation is especially true when one applies progressively stronger inner stimulation to get through some arduous and monotonous task, when renewed command of the motor apparatus is apparent. Actually, both motor and sensory adaptation act to protect the central nervous system from impairment; only the fact that the central adjustors can command new sources of stimulation from the backlash of tonic reactions enables the organism to break through these barriers when necessary and compensate for loss of phasic responsiveness.

Tonic Reactions.—We have already indicated that phasic reaction to stimulation is of necessity superposed upon tonic bodily trends. A vast array of motor processes comprise this organic excitation background, acting to direct sensory stimulation into specifically prepared channels of overt response and sustaining elaborate patterns of central adjustor activity. Most obvious and well-known for their energizing effect on phasic reaction are the processes of skeletal muscle tension; we often find them compensating for the deleterious influence of sleep loss and in work under distraction. Less thoroughly understood but of recognized importance are the visceral tensions and the postural changes in smooth muscle tissue; these often carry for long times the residual effects of frustration due to a deflection

of the central excitation pattern from the thwarted overt activity. Most vital of all factors to general reactivity level are the secretions of endocrine glands, called autocoids; these are poured directly into the blood stream, some secretions called *hormones* serve to excite while other substances called *chalones* serve to depress the activity of other glands and bodily tissues. Thus, the pituitary gland is known as the "motor" of the gonads and certain of its hormones are in-

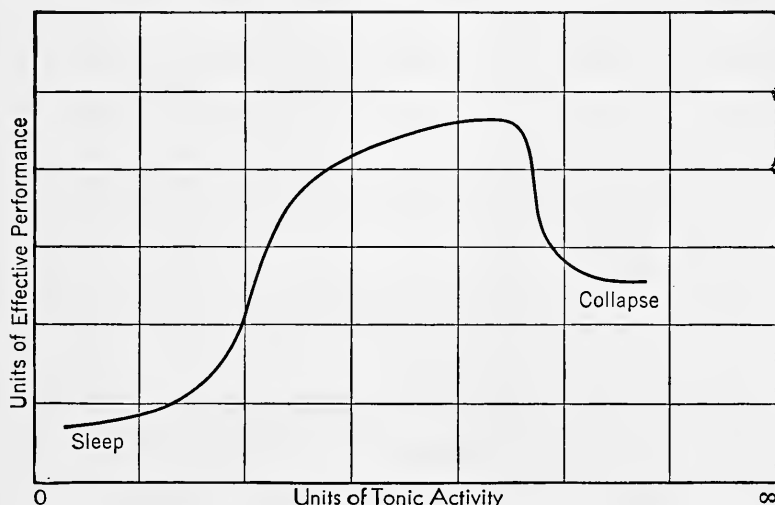


FIG. 33.—THEORETICAL RELATION OF SUPPORTING TONIC ACTIVITY TO THE EFFECTIVENESS OF PHASIC PERFORMANCE.

jected artificially to raise and lower sexual vitality. Another instance is seen in the favorable effect of the thyroid hormone on the general "drive" of patients with low metabolism. Adrenal and pancreatic gland secretions act with the autonomic nerves to raise and lower the body's general energy level.

As with our discussion of plastic reactions, we cannot treat here exhaustively the many qualitative variations in tonic activity, but shall mention only certain questions of operation which apply to all these processes. The first and most important concerns the relationship of quantity of tonic activity to the vigilance of the central nervous system. When is the brain "asleep," we may ask, and when is it in the state of excitability that is known to us as consciousness? Repeated demonstration of the relativity of so-called mental effort

and tonic motor activity leads us to assume that backlash excitation from these processes supplies a major portion of stimulation necessary for brain activity during waking hours. While final confirmation is far from complete, we may think of muscular tension and related tonic processes as supporting increasingly effective performance up to a certain point, after which more excessive reactivity is accompanied by performance of decreased effectiveness. As indicated in Fig. 33, performance levels sustained by a low degree of tonic activity would be akin to sleep, whereas the upper limits of reactivity would be accompanied by the collapse of integrated behavior.

It is also known that when overt phasic activity is blocked short of its goal, the supporting tonic processes tend to persist as a heightened reactivity level and so develop an excitation pattern which exerts a more or less constant pressure to be relieved. Experiments have shown that the more successful the overt reaction to a stimulus situation, the less the residual tensions. In this direction, possibly, lies new light on the ever-baffling problems of the neuroses, and it is proof of yet untouched areas, that physiological psychology is just beginning to become aware of its potential contributions to psychiatry.

BRAIN AND BEHAVIOR

Having taken into account the operation of both receptors and effectors, we are now left with the adjustor mechanisms that intervene. The primary function of these mechanisms is to integrate the various excitations coming from the receptors and to direct the effector responses with reference to stimulus conditions. In spite of their recognized importance, the control mechanisms in the brain and spinal cord are the most imperfectly known link in the total receptor-adjustor-effector sequence. Many elaborate theories of how these centers function in specific types of behavior rest upon assumed properties of nerve cells which have no basis in physiological experiment. The starting point for most of these accounts has been either the theory, dating from the phrenologist, Gall, that psychological activities are localized within minute brain areas, or the associated notion that all integrated activity is patterned after the spinal reflex. Neither of these theories is correct in fact. Gall's doctrine of localiza-

tion gains support from results showing definite impairment upon destruction of certain brain areas, but does not take into account many negative instances of vicarious function and gives no answer to the all-important question of how different areas exercise their functions or influence each other. Extension of the theory of reflex integration to this problem is also unwarranted; for while many spinal reactions such as the knee jerk may be explained by the conduction of impulses from receptors to effectors over inherently restricted pathways, greater plasticity of central connection is necessary to explain the more complicated behavior patterns. No amount of subsidiary theorizing in the form of allied reflex arcs or the interplay of facilitative and inhibitory neural circuits alters the fundamentally weak assumption that particular reactions are restricted to connections of lower "resistance" between individual nerve cells.

Experimental evidence on the localization of brain function involves two types of research. Each of these has contributed a somewhat different answer to the problem. The traditional approach consists in removal or stimulation of some general area correlated with such changes in effector or receptor activity as may be noticed. But dealing thus with a brain part in isolation is, in a sense, an artifact, and consequently the newer approach consists in taking some well-defined behavior pattern, such as a learned reaction, and correlating the different amounts of brain tissue removed with functional loss. The first approach gives a view of the special functional contributions made to the total behavior flux by grossly different anatomical structures; the second approach shows us that similar anatomical units within these gross structures are largely equipotential, that is, capable of being used in many different functional acts.

Structural Organization of Reaction Levels.—The gross divisions of the adjustor apparatus are responsible for the general form that the response takes. The same effector and receptor mechanisms function in many different types of behavior; but the structural arrangement of the central nervous system makes it an organization of levels, so that certain parts of it may dominate behavior at a given instant. For explanatory purposes a rough comparison may be drawn between this neural organization and that of a commercial agency

engaged in providing appropriate answers to an almost inconceivable variety of questions. In the interest of efficiency, simple and urgent messages are responded to on the ground floor level, the receiving clerks connecting directly with the sending clerks, and the news that a response has been made reverberating to offices on higher floors. If, however, an automatic response is not immediately forthcoming, or if the response made is not entirely appropriate, the higher offices take up the task of directing the sending end of the concern. The more complicated the problem, the more work will be put upon fashioning the response. The news will be transmitted upward from floor to floor, each department supplying whatever information it can give upon the topic. The nature of the message and the ability of a department to answer it will determine where the dominant direction occurs. Only those messages that cannot be answered appropriately at the lower levels are passed to a higher floor for decision. If they do reach so far, this office is in command of all the information which has been collected by those departments below it. In the central nervous system, the cerebral hemispheres represent the highest floor, the spinal cord the lowest floor, and other brain centers the intermediate floors. Nervous impulses developed by the receptor mechanisms may thus pass through different adjustor centers to effect motor responses, and the particular loop-line connection used determines the dominant center for integration.

Fig. 34 indicates the major features in the structural organization of reaction levels. The *spinal cord* carries integrating centers for local "reflex" response to local stimulation and is, in addition, the grand artery for entrance and exit of nerve discharges to and from other adjustor centers. A structuro-functional division of each of the spinal segments enables us to recognize nerve fibers entering the back, or dorsal, side of the cord as sensory and those on the front, or ventral, side as motor. Running parallel to the segments of the spinal cord are the *autonomic nerve chains* or ganglia which act as relay stations and independent correlation centers for smooth muscles and glands. The divisions of this part of the nervous system have opposed functions; the *sympathetic ganglia* serve to inhibit digestive actions and to mobilize bodily energies for emergency adjustments,

as in fight or flight; and the *parasympathetic* division controls the bodily energies for appetitive or vegetative reactions.

The brain has three divisions: (1) the hindbrain, which comprises the medulla oblongata and the cerebellum, (2) the midbrain, and (3) the forebrain, which comprises the thalamus and the cerebral hemis-

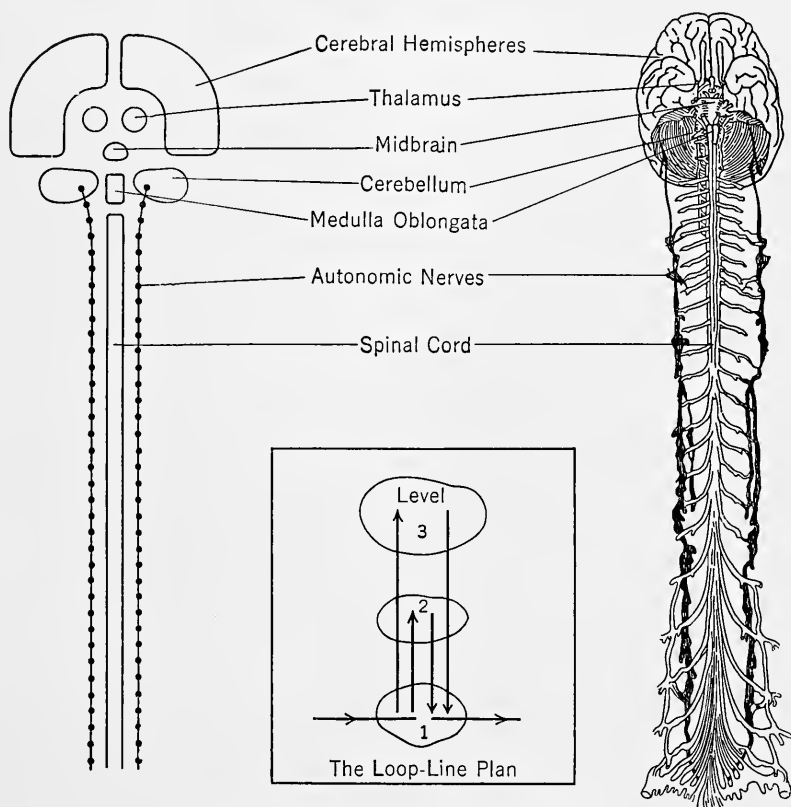


FIG. 34.—LEVELS OF NEURAL INTEGRATION.

pheres. The *medulla oblongata* carries control centers for respiration and circulation—automatic reactions necessary to the continuance of life. The *cerebellum* and the *midbrain* are two great coordinating centers for muscular responses, especially those of the tonic type. The *thalamus* is the vestibule by which sensory stimulation enters the cerebral hemispheres and is also a motor center for the regulation of

certain bodily activities involved in the emergency emotions. The *cerebral hemispheres* serve to coordinate the activity in lower centers, and specialize in directing the most complicated neuromuscular reaction patterns. These various brain parts have been successively superposed upon the spinal cord. As each new structure has developed, it has established connection with the lower and more primitive centers and taken over a portion of their function. In man, the cerebral hemispheres have grown so enormously that the outer layer or *cortex* is folded upon itself, forming many convolutions. This

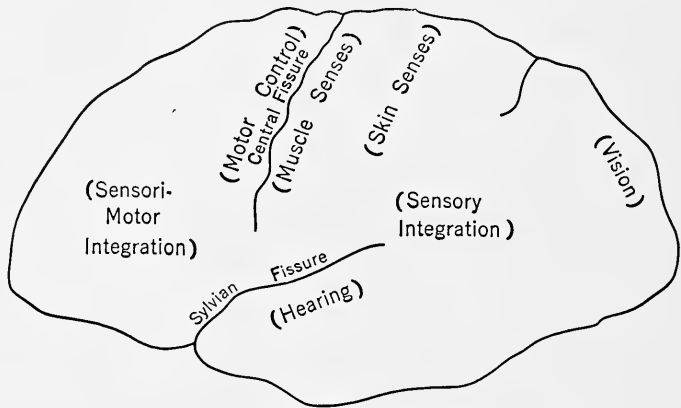


FIG. 35.—CORTICAL LOCALIZATION OF FUNCTION.

structural growth is paralleled by a degree of functional dominance over the rest of the adjustor apparatus which exists in no other species.

Certain areas of the cerebral cortex show a considerable degree of specialization, while equally large groups of cells seem to have more general facilitating and inhibiting functions. Fig. 35 shows the localizations roughly. The primary centers of motor control are located in front of the central fissure; at the lower end of the fissure is one of the centers of speech control and any lesion here will cause speech loss, or aphasia. The primary reception centers for stimulation from muscles and other internal tissues are in the parietal lobe, set in appropriate relation to the motor centers corresponding to these parts. The special senses also have well-defined reception areas—vision on the

medial side of the occipital lobe, and hearing in the temporal lobe below the Sylvian fissure. The remaining areas, including the frontal lobe, as indicated, are general integrating centers. The fact that these parts of the cerebral cortex are most adaptable and labile prevents the harmful stereotypy of behavior and has done much to make man ascendant over all other animals.

Mass Action within the Cerebral Cortex.—While various neural strata dominate different types of reactions, it is not to be inferred that individual nerve cells within a given brain part have exact functional specificity. This is especially true of the cerebral cortex, where equivalence of function reaches its highest development. The “engram” or trace of a learned reaction, so often “explained” by a lowering of the “neural bond” or “synaptic resistance” between two adjacent nerve cells, actually involves an area of considerable extent. Rats, and even higher animals, show residual effects of learned habits irrespective of the particular part of the cortex removed. The more complex the habit learned, the greater the difficulty experienced in establishing even the gross locus of the essential neural pattern. In general, the greater the amount of cortical tissue destroyed, independent of place, the more severe is the functional loss. The suggestion here is that the traces of previous functional activity are not laid down on the brain surface according to a strictly spatial plan, but exist as ratios of excitability involving a wide cortical territory and capable of being reorganized in the parts remaining after brain lesion. This relatively nonspecific response of cortical cells in the control of complicated discriminative behavior is known as *mass action*, and it is probable that upon complete removal of the cerebral hemispheres or the relative functional decortication produced by a startling stimulus, the thalamic centers act somewhat similarly in fashioning the emotional type of display. It is, of course, hard to estimate the extent to which results obtained on the brains of the animals apply to man. In so far as quality of tissue is concerned, the results are comparable; and aside from the primary sensory reception and motor projection areas, the cortical tissue of man seems to be generally capable of mass action and equipotential function. Cases have been reported of patients who recovered from complete re-

moval of the frontal lobe without serious impairment to their intellectual processes.

BODILY MECHANISMS AND PERSONALITY

The notion that personality traits are intimately related to structural differences of individuals has had a long and unjustified vogue. Such pseudoscientific approaches as phrenology and physiognomy are still practiced upon the unwary public, and there is much talk among certain psychiatrists of the characteristic mental disorders of special body "types."

Before we examine the evidence on this problem, it is well to recognize that psychological tests are only beginning to give us valid and reliable criteria for detection of different aspects or traits of personality. Until fairly recently, estimates of relative intellectual ability rested upon nothing more substantial than the opinions of the persons making the concomitant structural measurements; and even now we find gross system-classifications of abnormal behavior substituted for continuously graded tests of the emotional or non-intellectual aspects of personality. With this state of affairs on the psychological side, and with the difficulty of making complete anatomical and physiological assays on a sufficiently large sample of the population, it is small wonder that few definite relationships have been found. The balance of evidence is definitely negative with reference to an intimate connection between physique and personality, but a few suggestive reports show that more subtle physiological variations may be involved.

The Psychoanatomy of Types.—The psychoanatomy of types assumes that men can be pigeonholed into several rough divisions according to their general structural development and that these divisions will correspond, also roughly, to fundamental differences in temperament and intelligence. This notion can be traced as far back as Hippocrates, and contributions since that time have been chiefly the substitution of more exact physical measurements without a corresponding increase in their significance. Height, weight, carpal development, height-weight ratios, head shape, and relation of limb to trunk development have all been tried and found wanting. For

example, the correlations between height-weight ratios and tested intelligence on the average are so small (+.28) that normal individuals of extreme limits in size may show almost any degree of intelligence from high to low; and the slight relation reported between body type and emotional disorders provides no basis for individual prediction. We can see, therefore, that the only possible connection between physique and personality would have to come from some common determining factor, such as the endocrine glands; and only in extreme cases, as in the thyroid deficiency of cretins, could we expect an obvious relation. It is difficult to see why in the face of such low correlations as have been found, the psychoanatomy of types is still so well received. The automobile mechanic is not misled even by a high apparent correlation between body build and engine power, but directs his attention to the essential physical correlates of power. It would be sensible to adopt a similar attitude with reference to man.

Neuroanatomical Differentiation.—Numerous attempts have been made to correlate the intellectual aspects of personality with differences in neural structure; but no post-mortem method of assorting brains on the basis of weight, size, number of convolutions, or thickness of the cortical layer has yet served to classify them as to previous functional capacity. The six-per-cent difference in brain-weight between men and women disappears when corrected for the proportionally heavier bodyweight of men and so constitutes no evidence of superior function. Widely quoted surveys of the brains of "geniuses" have little or no statistical reliability. Whereas absence of large amounts of cortical tissue certainly lessens capacity to learn, the brains of superior human beings probably have not only an extensive mass of tissue but are also very highly organized. A complicating factor in all of these studies is the uncertainty as to what part of a given brain was once functionally active, and what portion was inactive tissue, serving merely to support and protect the active parts. There is great need for more delicate and refined techniques of differentiating brains, and it is here that brain chemistry—with its assay of the products of cell activity—may prove very useful. At present we can only surmise that it is neither the amount of cortical

tissue nor the quantity of energy available which alone accounts for the abilities of man, but rather differences in the capacity of brain structures to make efficient use of the bodily energies as well.

Physiological Differentiation.—For many aspects of personality, especially the so-called temperamental traits, it now seems that such bodily bases as exist are more likely to be revealed by physiological analysis of behavior than by attempted correlations with either gross or microscopic anatomical structures. Measurable variations that are probably important to this problem include metabolic rate, blood pressure, and electrical skin resistance, muscular tension and the acidity of the blood, urine, and saliva. Differences in the hormone content of the blood undoubtedly have even greater significance, but biochemical assay is not yet ready for such a complicated field of research.

It is difficult, as yet, to say exactly what these various physiological measures indicate in terms of general organic reactivity or of differential body chemistry. Individuals rated as "neurotic" or "lacking in emotional stability" show high variability and slow recovery of equilibrium in skin electrical resistance measures taken during displacing stimulation. On the other hand, attempts to relate such results to specific glandular or muscular conditions have not been generally successful. In the absence of adequate information it is easy to be led into abortive speculations. Thus, one writer foretells the day when "the physician will have bottled hormones labeled 'happiness,' etc." Such a seductive verbalism minimizes the tremendous obstacles which are yet to be surmounted and actually hampers study of the precise relationships between endocrine activity and total behavior.

Conclusion.—One cannot review the problems of physiological psychology without being impressed by the magnitude of the task remaining to be accomplished. Much of the work mentioned in this chapter has been negative, serving mainly to sweep away old and false notions. On the other hand, the new lines of attack which are developing hold tremendous promise for the more refined prediction and control of human behavior. Students interested in detailed infor-

mation on the topics covered should consult the selected references given below. From such books, even more than from this introductory account, the inseparable linkage of psychology and physiology becomes increasingly clear. For example, gastric ulcers are now seen as related to frustrations of behavior, while surgical removal and glandular treatment are being successfully prescribed for disorders which would formerly have received only a "mental" treatment. The psychosomatic approach to abnormal behavior is one of the most promising frontiers of present-day science. Its development is ready and open to laboratory and clinical workers who are trained conjointly in psychology and physiology.

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CHAPTER XX

AESTHETICS

By KATE HEVNER, *Indiana University*

INTRODUCTION

The Problem.—With the first intimation that there is to be a scientific analysis of art and beauty, the romantic and tenderminded aesthete will perhaps take a hostile attitude. Such an attitude would be regrettable, for the appreciation and understanding of beauty is a skill that requires a great deal of practice and experience; and with the great complexity and specialization of modern life, we should no more expect the layman to acquire this skill in appreciation without systematic instruction than we would expect him to acquire proficiency in French simply by listening wherever possible to the French language or by spending some time in a French city.

The problem for the psychologist in the field of art is a complete description of the experience of beauty. He must make an analysis of the process of appreciating or enjoying beauty so that he will know what kinds of stimuli (music, painting, drama, poetry, etc.) arouse it, what are the necessary steps in learning it, and how to control it so that it may become a more intense or a more frequent experience. The philosopher discusses the nature of art, the anthropologist traces the origin and development of art forms, the sociologist studies the interaction of art and society. The psychologist describes exactly what is going on in the individual at the moment when he exclaims "Isn't that beautiful!" and how this activity is differentiated from all other kinds of human activity.

There is a popular misconception that the aesthetic experience is a kind of miracle which stabs the heart, and shakes the soul, and takes the breath away. It is felt by those who "possess the organ by which poetry is perceived." It would be as ridiculous to speak of those who "have the organ with which tennis is played." If one

has the leisure, the opportunity, the interest, either can be acquired, and there is no evidence that more special talent is required for one than for the other.

Acquiring the skill of appreciating is comparable to any other kind of learning. There are the simpler and more fundamental reactions to be acquired, and from these we proceed to the manipulation of higher units. The skillful rider and jumper will disdain the restricted ring where the beginners are practicing mounting and trotting, but no one would deny that these are necessary preliminaries. Too exhaustive an analysis of one poem may destroy forever its aesthetic quality for the student, but the process will enhance the poetic quality of verses which he encounters in the future. To maintain our aesthetic skills, in a dynamic society such as ours, taste must be continually changing and growing. To be dissatisfied with our earlier enthusiasms is one of the best signs of aesthetic health.

THE AESTHETIC EXPERIENCE

General Characteristics.—The beauties of today — music, painting, literature, drama, sports, nature—are so different one from the other, and the ways of enjoying them are also so many and so varied that the psychologist who tries to describe *the* aesthetic experience faces almost as impossible a task as a doctor who might try to prescribe one single remedy for all kinds of diseases. Nevertheless it is important to have a clear analysis of this kind of experience for every amateur has need of it in understanding and developing his artistic enthusiasms. For this description the psychologist must draw not only upon the facts and theories of psychology in general, and upon the large body of experimental data in the psychology of art, but also upon the records of the poets and painters themselves. In fact, biography, criticism, and miscellaneous evidences of the artist's methods of working are sometimes of more value than carefully laid out experiments even though it is difficult to transform ecstasy, inspiration, and genius into terms which square with the facts and theories of modern and scientific psychology.

Let us first answer the question: What *is* the aesthetic experience? What does it feel like to be having it, and how can you tell

when you are in the midst of it? At the outset we must make clear that the aesthetic experience is a very complex function rather than one single category of activity exclusive of all others. That is to say, it is in a class with such activities as playing bridge or tennis, debating a political problem, shopping for a new wardrobe, rather than *one* limited psychological function such as thinking, memorizing, perceiving, each of which has its distinctive and mutually exclusive character, even though it rarely or never occurs in a pure state. The aesthetic experience is rather a blend, a complex, which borrows from practically every one of the other functions, and derives its unity from the subjective aspects and diffuse bodily responses rather than from the compact means-to-end objective set that organizes most of the other complex activity of everyday life. It is usually an experience with a pleasant affective tone, although not necessarily so (for example, it may be ugly, or tragic), and it stands out a little from the general flow of neutral activity with a certain dignity, intensity, and unity so that one may recall it later as a definite experience. One turns back to the more common attitudes of daily life with a distinct feeling of having made a transition.

The aesthetic experience is complex in the same way that driving a car is complex. We might say that the activity of driving a car is composed of sensations of pressure on the accelerator foot, of tensions or readiness in the arm muscles, of wind on the face, together with a definite set of the head and eyes, with attention on the road and its signs, a feeling of or drive toward a purpose or goal (destination), and perhaps some slight emotional activity either of fear or exhilaration. But it might also include such extraneous activity as smoking a cigarette, or carrying on a conversation, the making of judgments, experimenting with the mechanism, etc. A symposium or round table of psychologists to discover the "essence" of driving, would bring out as many different viewpoints and theories as we find in the history of aesthetics, and for the same reasons.

It is customary to speak of persons as having "talent" for art, or an artistic temperament, but a more precise description would state that certain individuals are in the habit of taking an aesthetic attitude toward their experiences. They have a certain way of look-

ing for certain values and making certain judgments, rather than others. They look for broad meanings, for generalizations, for abstract qualities, for patterns and rhythms. Their habitual standards of reference are beauty, ugliness. We may discern other and different habitual attitudes among individuals of our acquaintance—a sentimental attitude which calls for the more romantic view of life, with a ready tear and a lush complacency; or the argumentative attitude, with a brittle skepticism toward men and motives; or a consistently optimistic or nonchalant and objective attitude. These become habitual ways of reacting, not absolutely fixed and continuous but frequent enough to be commonly recognized.

An Active and Attentive State.—The aesthetic experience is always an active, an intensely active, state of mind and body, not at all the passive acquiescence which appearances sometimes seem to imply. To be sure we sit at leisure to enjoy our music, we pause inactive to gaze at a picture, and many of our aesthetic experiences take place while we are in the more quiet bodily attitudes. The amateur has therefore often believed that we must be relaxed and limp, drained of our own initiative and energy so that the reaction from the aesthetic object may flow over us unresisted. Such figurative language has thwarted perhaps the attempts of many a novice who has tried to penetrate the mystery of appreciation by this method. No attitude could be more inauspicious. Appreciation requires alertness of mind and body. Attention must be directed wholeheartedly toward the objective stimulus and “attention” means that a state of readiness, of partial contraction, is being maintained by the muscles of the body, that the eyes are turned toward the stimulus and actively focused there, that the ears are catching every detail of sound, that the mind follows the senses to supplement and interpret. It means also that the musculature is not occupied with any other activity, that it is free to respond to the movement and the rhythm of the stimulus, that it is actively seeking to follow every suggestion, to emphasize the experience at every point. Relaxation is lassitude and finally oblivion and sleep. Appreciation is muscle tonus, muscle coordination; it is activity, tensions, responses. It is awareness, alertness, animation, energy.

Sensory and Perceptual Activity.—Sensations themselves claim much more of the attention in this attitude than in other attitudes of life. Because of the economy demanded in our ordinary attitudes we pay the minimum of attention to our sensations, using them only as cues from which to catch the significance for further reaction. The sound of the clock enters consciousness only as an indication of lunch time; the sight of the clouds serves only to set in motion the business of closing the windows against the storm. In such cases we react to our sensations strictly in terms of their meaning. But in the aesthetic attitude we linger over the sensations as pure sensations, following the reverberations of the sounds, inhaling deeply of the aroma, tracing the movements, and feeling the brightnesses. We dwell on the qualities and intensities of the colors, the shapes, the sizes, the blends, the richness, the extensity and intensity, experiencing them not only with their proper sense organs but with the whole body. We follow outlines and surfaces with eye movements and muscular tensions, interpreting one sense by means of another and translating sounds and sights into kinaesthetic experiences, the better to apprehend them and to enhance and intensify the original sensations.

Along with this keen attention to the qualities of the sensations, the relations or patterns among the sensations themselves must also be noticed. The succession of separate tones becomes a melody, the combination of certain lines becomes a "figure" upon a "background," and our attention is held by these various forms. All the elements in a musical composition must be organized and reorganized into still larger units until the process of perceiving the piece as a unified whole is an immediate and effortless achievement. There is a melody in the bass which must be discerned and the progress of the harmony must be followed, first independently and then in relation to the various other melodies. The separate phrases of the melody must be identified so that they may be recognized when the composer uses them in different fashions. We must hear the repetitions and the contrasts, be alert to variation, elaboration, ornament. We must concentrate our attention first on one element and then on another, devoting all our bodily energy first to the pulse of the rhythm and next to the developing and expanding of the harmony

and then to the echoes and extensions of the melody, returning to this element or that until the whole becomes not one thin and simple unit of perception, but a rich and vivid experience, crowded with sense impression and quickened with muscular tensions.

In the graphic arts there are the same possibilities for enriching and enlivening the original experience, for emphasizing and relating the various parts. Take occasion to notice, for example, the pattern of one of the colors in some familiar picture. Locate all the separate bits of it and see them as one pattern. Find all the lines which turn in one direction. Observe them as a unit and feel the pull of them. Look for the different planes and distances, the nearest one, and the farthest one. Notice the brightnesses and dullnesses, the lights and shadows, and organize them into a pattern. Look at the picture with half shut eyes and see the parts that stand out from it. Relax the whole body and let the eye wander over the picture lazily, observing the progress of the eye movements. Walk away and come upon it suddenly from a different angle. Look at it in a mirror and continue the search for new patterns. Try to memorize it, to imagine it different.

Of course by the end of such an exercise the observer will be utterly and indescribably bored with the picture, completely impatient and exasperated with the music. He will resent them as bitterly as the child resents his piano scales and his problems in long division. But we must remember that the objective was not the appreciation and enjoyment of the picture, but the building up of habits of observation; the awakening of the senses and the training of the perception so that the apprehension of the details will be ready and nimble. For if the skill in perception is slow and awkward, if the mere task of comprehending the form demands all the attention, there will be no time or energy left for the enjoyment of it. The pleasure of the total effect would be lost, just as the smack of a French epigram is lost to a beginner whose French is so poor that he must decipher each syllable with painstaking care. To achieve any pleasure in art, as in language, the facility must be so ready that as the sentence proceeds (or as the music proceeds) one is aware of the trend of the ideas and approaches the end with a certain foresight. Then the conclusion will be important as a fulfillment, and it will be rich with satis-

faction because it was wanted and needed. The moment for its enjoyment, however, must always be free. For the inexpert, the effort and confusion and uncertainty will crowd out the pleasure, and the experience cannot be crowned with success.

The process of acquiring this skill, however, is itself an aesthetic process, for each newly discovered pattern or insight brings an increment of enjoyment. So long as the last bit of the music can catch our wayward attention, we shall find it absorbing and beautiful. It is like the child's pleasure in the hundredth telling of the fairy tale. He can anticipate each detail of it as it unfolds itself in the telling, but he could not recall it of his own volition. He cannot foresee the end from the beginning nor yet from the middle—in fact not until that very last penultimate detail is set in place for him. When the music is completely known to us, when there is no slightest detail of it that escapes our anticipation, when memory serves all too well, and curiosity is entirely dead, then it requires an effort to hold our attention upon it, and with that the pleasure is gone and we find the music wholly trite and thoroughly objectionable. The life of a popular song is said to be approximately three months .

The Role of Empathy.—In the apprehension of the beautiful stimulus, a process called empathy (German: *Einfühlung*, or “feeling into”) was first recognized by Theodor Lipps as playing a significant part. In empathy we project our own states of being into inanimate objects, and attribute to them the activities which we ourselves are experiencing. The sensations of strain and movement from our own muscles and joints, induced directly by the stimulus, are not perceived as our own sensations, but are projected into the stimulus, and thus give it greater significance. Modern experiments have shown that actual *movements* can be detected during the process of perception. These often do not come to consciousness as sensations of our own movements. If they do, and if we are self-conscious to the extent of experiencing them as our own sensations, to that extent we have lost our aesthetic attitude because our attention is no longer upon the art object but upon ourselves. Schoen² has pointed out, however, that empathy is not limited to the aesthetic experience but is a psychological principle of the source of all meaning. All significant experi-

ence is an instance of empathy. Inner strains, incipient movements and stresses are phases of all perception and not at all limited to aesthetic perception. Philosophers and critics of the end of the nineteenth century greatly overworked the concept of empathy when they made it the sole basis for a theory of aesthetics.

Meanings in Aesthetic Activity.—In seeking the meaning of the sensations and perceptions the aesthetic attitude is again contrasted with the usual daily reaction in that it turns away from the useful, the personal, and the concrete toward the fanciful, the impersonal, and the abstract. It is not that we are never occupied in our daily routine with abstractions, for in solving any simple, practical problem we make use of such abstractions as the state of our health, our financial standing, our knowledge of chemistry, or economics, etc., and to bring these necessary concepts to mind, we engage in activities which we call reflecting, summarizing, evaluating. But in the aesthetic attitude these concepts and references are not so immediate and personal. To put it more succinctly, when the meanings are abstract, far removed, nonpractical, and impersonal we find in them an aesthetic quality. Because the adequate conception of them demands more of the effortful mental activities—recalling, summarizing, evaluating—they are characterized by a breadth, distance, largeness which gives them that sense of importance and mastery characteristic of the aesthetic moment. It is their infrequency and unusualness and difficulty that sets them apart and enshrines them, placing them a little above the plane of daily achievement. That is why the ugly—death, horror, deceit, angry passion—acquire so readily the aesthetic quality. In so far as these concepts are abstractions, unusual, and impersonal, their representation in consciousness requires effortful summarizing and evaluating which brings with it the largeness and breadth of the aesthetic moment. When vivid sense impression and emotional toning are also added—and these are very likely to arise—the experiencing of these ugly realities has all the qualities to make it an aesthetic experience par excellence.

This sense of mastery, this insight, this consciousness of difficulty overcome is the invariable accompaniment, perhaps even the *sine qua non*, of the aesthetic experience. Insight is the sudden compre-

hension of the relation of the details of a certain experience which gives it a wholeness and fixes it definitely and completely into place among other concepts. We use the word "sudden" because this wholeness can come only while all the numerous details are fresh in the memory so that their integration seems important, while the effort, the puzzling, and the straining to organize them is vividly present. Without the felt effort and the remembered disorganization the significance of even the most profound utterance becomes utterly trite and empty. The aesthetic moment is the realization of the felt want completely fulfilled. The deeper the want, the harder the struggle to fulfill it, the more mental and bodily activity involved, the greater will be the satisfaction.

The Role of Emotion.—The aesthetic experience also has an emotional accompaniment, which helps to give the other activities their importance and significance. The art object always has a moving effect. It appeals, as William James would say, to the bodily sounding board. A genuine emotion, a physical response of more or less violence, with clenched fists, shaking knees, flushed face and fast, deep breathing, with visceral reactions and that familiar all-gone feeling in the pit of the stomach—such a stirred-up state of the whole organism is of course never present in the aesthetic experience. An experience of such violence would completely absorb all of the attention and there would be no awareness of the other necessary components, the sensations, perceptions, and ideational activities. The emotional content of the aesthetic moment must rather be in the nature of a mood which we define as qualitatively like an emotion but a much paler and more diluted emotional state. It may be sustained over a much longer period of time and needs only a few of the characteristic bodily components to make itself felt. The gentlest stab of visceral reaction, the slight lifting of the head or the faint tightening of the throat may be sufficient to throw the glamour of emotion over an experience, to give it color and poignancy. A gesture or an attitude copied from an art object, a suggestion, conscious or unconscious, which finds its answer in a muscular or visceral response will serve to emotionalize the whole experience. Even the bodily symptoms derived from a totally different source may lend

their effects to a neutral stimulus, making it seem for a time a beautiful thing, as when the effects of certain drugs enhance all sensation and perception for short periods of time, giving all experience an aesthetic quality. The effects of the sex hormones likewise produce periods of heightened sensitivity and an emotional toning wherein otherwise drab personalities, objects, and experiences are transposed into the realm of the aesthetic.

Important Criteria of the Aesthetic Experience.—Along with this general description we will further differentiate two specific criteria of the genuinely aesthetic experience, which, to be sure, have already been mentioned in passing—(1) the attention must be centered on the beautiful object, and (2) there must be the feeling of insight, of comprehension, of significance, of mastery.

If these criteria are correct, then this would mean that the truly aesthetic experience cannot be of long duration for the constant shifting is the prime characteristic of attention and when the shift is toward practical matters, to the feelings or mood, to anything of a personal nature, the attitude is for the moment lost. Likewise when the beholder is consciously reasoning, studying, and evaluating the material, experiencing the effort and strain, the struggle, the defeat, his experience is not aesthetic. The true "appreciation" then, the authentic experience of aesthetic enjoyment is a period of constant shifting from one attitude to another and the aesthetic moment is more vivid, in fact is only possible in contrast to the alternate periods of effort and of self-consciousness which are interspersed with it. As the attention fluctuates from one aspect of experience to the other, the aesthetic attitude comes and goes. It is therefore possible to spend an evening listening to a concert or reading a novel and to have a continuously growing experience. One may become more and more absorbed in the music so that the periods of aesthetic attitude are of longer and longer duration. The bodily responses are more and more intense and unified in tone, the sensations organize themselves more and more readily, the insight covers more and more of the details of the music structure. The personal and self-conscious attitudes are pushed farther and farther into the background.

Different schools and creeds may variously describe this occurrence as detachment, or disinterestedness, or repose in the object of beauty, or objectified pleasure; they may center the process around catharsis or significant form or empathy or distance or even intuition or social expression. Each of these theories emphasizes certain aspects of the experience of beauty and if their protagonists should attempt a subjective analysis, using exclusively modern psychological terminology, many of the above paragraphs would undoubtedly be duplicated.

Individual Differences in the Aesthetic Experience.—In our discussion we have not only assumed an aesthetic experience occasioned by some of the standard objects of beauty, but we have assumed a typical, complete, and well-rounded experience, common to the more or less cultivated individual. Obviously the experience may be something different, something better or something rather less than the standard product we have described above. These variations, the individual differences always expected in psychology, we conceive as quantitative rather than qualitative differences. They are differences in degree, in intensity—permutations and combinations of the various components of the experience. Some of these expected differences we will outline briefly.

(1) Essentially, as already indicated, appreciation is a moment of fulfillment when the importance, the significance, of our present experience is uppermost in our minds and when our attention is on the objective stimulus which has occasioned the experience. The significance may arise, however, from a number of different sources, from the emotional thrill which shoots through the whole body, from the meaning, the ideology which has such a strong pull on our own lines of thought, from the intensity and keenness of our sensations, or from our concentrated struggle to discern the pattern or meanings. The specific avenue of approach varies from time to time and from person to person.

(2) Individual differences in capacity for the aesthetic experience as well as in the acquisition of skill in appreciation are of course to be expected—the usual differences in talent and in training. Some enjoy music rather than the visual arts, some find depth rather than

frequency of experience. Others seem to enjoy in all directions and still others in none. Certainly there are large differences in sensory endowment which must show up in important ways. Ease and rapidity in the flow of ideas and associations must also have their effect, and the quickness and acuteness of the bodily responses in the affective life. The degree of muscle tonus, the glandular secretions and hormones, the body chemistry in general must also play a large part in the readiness to respond and in the susceptibility to the stimulus of the beautiful.

(3) The genesis of this particular kind of experience—the aesthetic—is as yet an unexplored process and a study of its development might fail to disclose the usual progress from simple to complex, from easy to difficult, from the rudimentary to the richly complete. The history of the aesthetic experience from infancy to adulthood may show on the contrary a disappearing function. In its earlier stages it may be a continuous unembarrassed forthright enjoyment of the sensuous and affective life, crowded with significant and important experiences and insights, which gradually gives way to the self-conscious and the practical, to the restrained and colorless round of ordinary adult activities.

THE AESTHETIC OBJECT

The Problem of Form.—In the study of the aesthetic object the problem which is central and important for psychology is the problem of *form*: What is form, what is good form, and what part does it play in the aesthetic experience? Form in art is always contrasted with meaning or subject matter. In painting, the form lies in the shapes, colors, lines, and patterns rather than the recognizable objects, the pictured scene, or the story which it tells.

Form in Poetry.—In poetry the form in contrast to the meaning is the sounds of the vowels and consonants, the patterns of rhythms, rhymes, and accents. The form of a poem is exactly what one would hear if he listened to the reading of a poem in a foreign language which he did not understand. It is exceedingly difficult for the casual listener to divorce the sounds of words from their mean-

ings and it is therefore difficult for us in America to "hear" the poetry of a poem in the English language. As a consequence psychologists who have wished to experiment with form in poetry have found it necessary to manufacture their own poetry, selecting a certain stanza length, meter and rhyme scheme, with various alliterative patterns, and then fitting nonsense syllables into this framework. If a bona fide poet should undertake to "manufacture" such poetry, unhampered by the necessity of choosing the words for their meanings, he could produce stanzas which for sheer beauty of form would far surpass the meaningful verses which he ordinarily creates.

The average student is familiar with the more obvious kinds of poetic form, the lyric, the elegy, the sonnet, etc., each calling for a distinctive pattern of meter, rhyme, stanza length, etc. Familiar, too, are the most common meters and line lengths, iambic pentameter, spondees, anapests, etc. But there are more important and more subtle elements of form, details by which one author may be distinguished from another even though both are writing in the same meter and stanza form. These more subtle elements, though appreciated by critics and connoisseurs, have only recently been isolated for scientific study by objective experimental methods. In prose style,³ for example, counts can be made of the numbers and proportions of monosyllable, two-syllable, three-syllable, polysyllable words, the proportion of adjectives to nouns ("adjective quotient"), proportion of nouns to verbs, proportions of dependent clauses, periodic sentences, words of Latin or Anglo-Saxon origin, etc. Graphs can be made to portray these quantitative studies more effectively. For poetic style, a long series of experimental studies by means of voice records has shown that the true form of poetic line is not the set meter,

˘ — ˘ — ˘ — ˘ — ˘ — ˘ —

The curfew tolls the knell of parting day

but a changing distribution of normal, strong, and weak accents or stresses, together with longer and shorter pauses and a rising and falling in the pitch of the voice. In other words, each verse should be written out as a line of music, with whole, half, quarter, and eighth

notes to indicate the rhythm, and with a melodic line adjusted to the speaking of the separate words and to the meaning of the line. Such quantitative and objective studies of poetic form will bring out the variations in rhythms, or cadences, and inflections of pitch characteristic of each individual poet.⁴ Scarcely any line of poetry will scan perfectly, and *it is these variations from the set meter rather than the meter itself that constitute the beauty of poetic form.*

Expressiveness of Form: Unity between Form and Content.—In music, the form is more readily abstracted from its meaning by the layman. In fact, form is so predominant in our experience of this most formal of the arts that very often music is apprehended as pure form, and the meaning or program is negligible or entirely absent. We listen only for sensuous and perceptual experience, rather than for meanings. Because of this characteristic of music, the most extensive experiments in the function of form have been carried on in music rather than in painting or literature. Let us suppose, for example, that a composer has undertaken the task of setting to music a spirited ballad of adventure. He creates a piece of music which fits the length, the rhythms, and the meter of the poetry, and with a melody and a harmonic scheme which seem to him suitable for the ideas and the story. He might play his music (without the words) to an audience ignorant of its purpose and ask them to report to him the moods and feelings which they absorbed from it, or in other words, the expressiveness which it has for them. If they should report that the music seems vigorous, strong, restless, exciting, he could feel reassured that his music is complementing and enhancing the effect of the words. More technically we would say that there was a unity between the form and the content of the song, and we should expect that it would be particularly effective as an art form.

Expressiveness of Lines.—Such unity between form and the content in painting has often been pointed out by critics. It has been said that Botticelli and his pupils must have understood the effect of certain lines on mood to judge from the clever way they arranged the hair in their portraits.⁵ In one certain portrait the hair has the form of restless waves, with a heavy braid hanging down on one

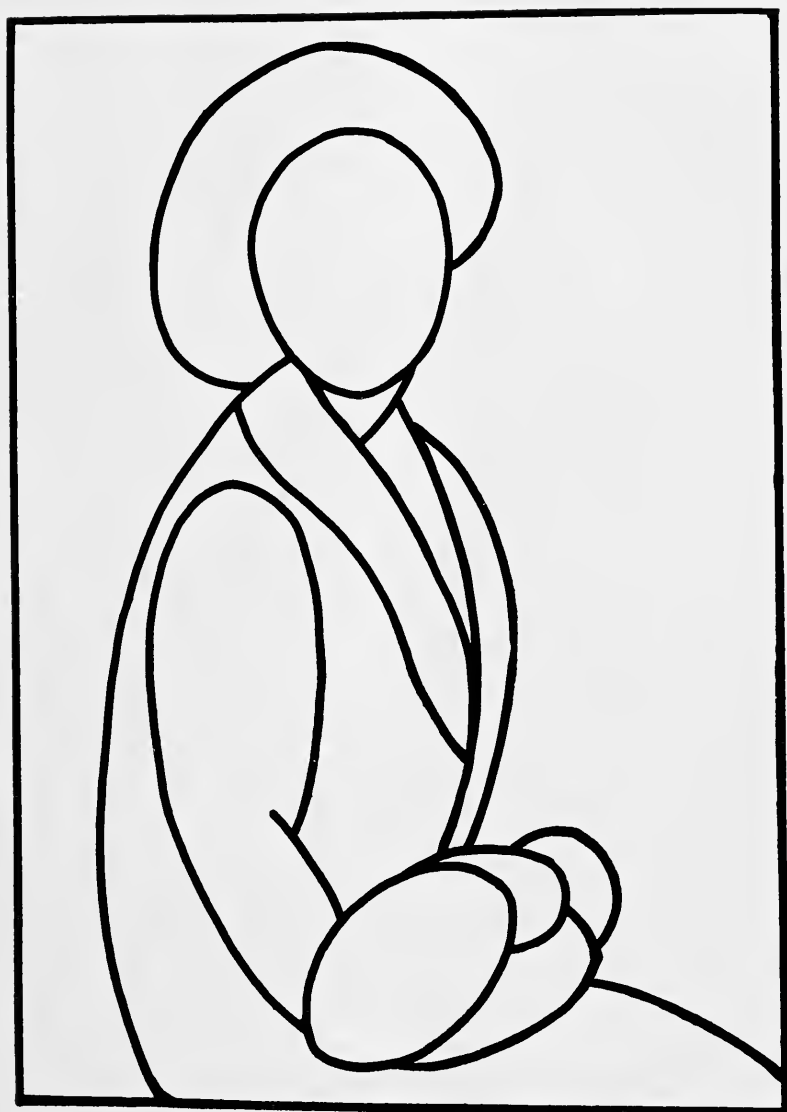


FIG. 36.—PORTRAIT A. CURVES.

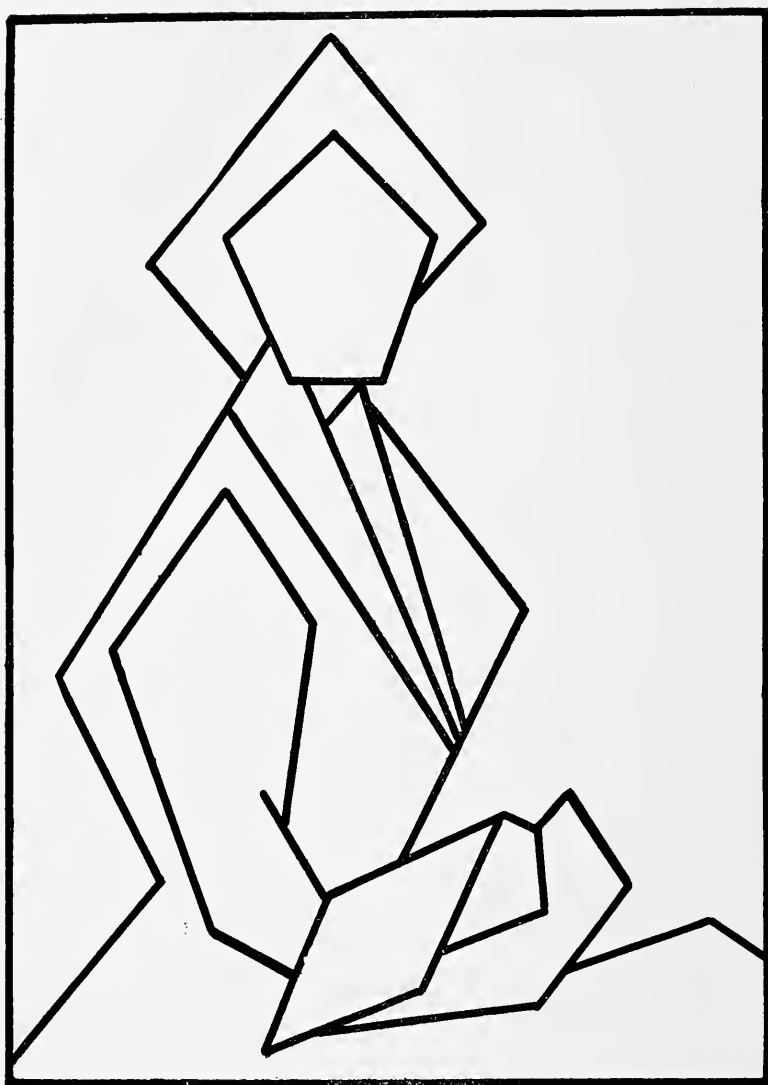


FIG. 37.—PORTRAIT B. ANGLES.

side. The face is full of animation and restlessness, and the hair seems to be appropriate for the temperament of the girl. In another portrait representing a woman in a pensive quiet mood, the hair is brushed straight back from the face with only one strand escaping.

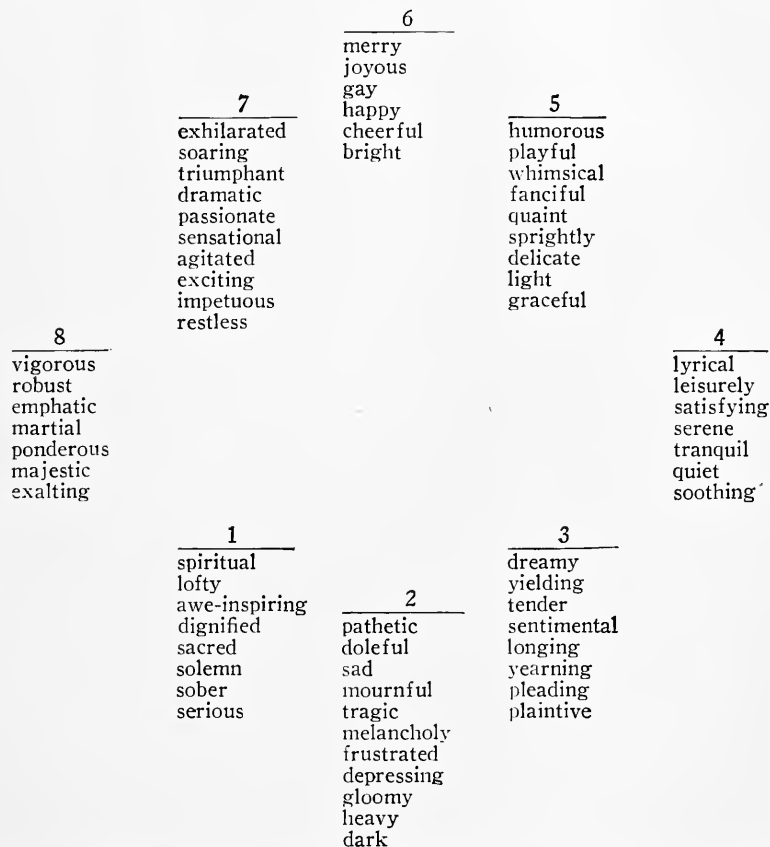


FIG. 38.—CONVENIENT ARRANGEMENT OF ADJECTIVES FOR RECORDING THE MOOD EFFECT OF MUSIC, OF POETIC SOUNDS, COLOR AND DESIGN IN ART, ETC.

Contrasting moods are represented opposite each other on the circle, and a complete circuit carries one through all the most common affective states. Observers check as few or as many adjectives as they like.

Psychologists have explored the expressiveness of lines both by requesting their subjects to draw lines which seemed to be expressive of certain feelings or moods, and by asking them to match certain given lines with adjectives. In one such experiment five hundred

subjects were asked to choose the appropriate type of line for each of thirteen different feelings.⁶ The eighteen ready-made lines from which they chose included wavy lines with small, medium, and large curves, and angular lines with the same variations. They found that quiet gentleness was indicated by wide curves in horizontal position, agitation by small angles running upward from left to right, etc. The reader may judge for himself the effectiveness of line quality by turning to the two outline sketches of a seated figure on pages 709 and 710. From the circle of adjectives representing eight different

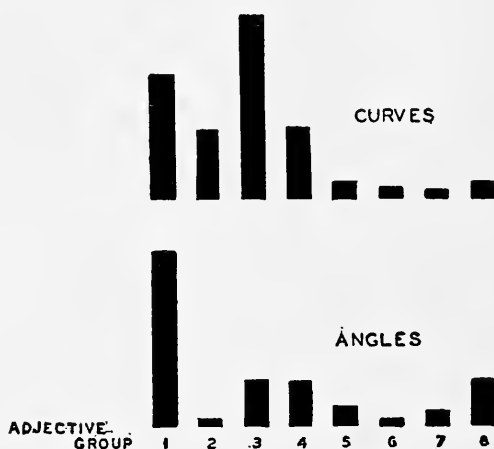


FIG. 39.—PROPORTION OF VOTES IN EACH ADJECTIVE GROUP, FROM 50 OBSERVERS, FOR PORTRAITS A AND B.

moods or feelings (see Fig. 38), he may check all the adjectives which might be used to describe the person who is represented in Fig. 36, Portrait A, and Fig. 37, Portrait B. The graphs which represent the characteristics attributed to each figure by fifty observers are presented in Fig. 39 and since the postures and the designs are the same for both figures, the differences in the characteristics must be attributed to the qualities of the lines.⁷ It is obvious that the successful portrait painter can indicate the personality of his subject through his choice of color, line, and texture as well as by the pose and facial expression.

Expressiveness of Sounds in Poetry.—In poetry the critics have often pointed out effectiveness of certain sounds and especially of certain rhythms for the creation of mood effects. The harsh consonants and clipped rhythm of the line

“Rebuckled the cheek strap, chained slacker the bit”

give a greater feeling of strain and energy than the slower smoother

“And still she slept an azure lidded sleep
In blanced linen, smooth and lavender’d.”

Tennyson’s lines describing Sir Bedivere carrying the dying Arthur have been much quoted for their effective sounds, especially for the contrast in sounds, rhythms, and mood offered by the last two lines.

“Dry clash’d his harness in the icy caves
And barren chasms, and all to left and right
The bare, black cliff clanged round him, as he based
His feet on juts of slippery crag that rang
Sharp smitten with the dint of armed heels—

And on a sudden, lo! the level lake
And the long glories of the winter moon.”

Experiments have been devised whereby subjects have been asked to change the meaning of nonsense syllables in a certain direction by altering one sound.⁸ Or the observer is asked to decide which of two syllables seemed smaller, for example, *sost* or *dost*, *dost* or *dist*, *doosh* or *deesh*, etc. Again, experimental “poems” have been “manufactured” containing a predominance of long open vowel sounds such as *ōō*, *ā* and *ō*, and soft, round, pleasing consonant sounds such as *r*, *l*, *m*, *rd*, *ld*, *rl*, etc., to be contrasted with high thin vowels *ēē*, *ī*, *ā*, and harsh consonants *z*, *ch*, *k*, *st*, *g*, etc. Verses were also written of two and of three syllable meters and of various patterns of voice inflections. The effects of these variables were studied by checking adjectives from given lists.⁹ Rhythms were found to be much more effective in expressing the mood than any other element,

with voice patterns second, consonant sounds third, and vowel sounds of much less importance. Harsh consonants are more gay and humorous, and the deeper open vowels more dignified and powerful.

Expressiveness of Music.—In the earliest experiments on the meaning of music the psychologist asked his subjects to listen to phonograph recordings of musical compositions and to record their thoughts and feelings. It was discovered that there were large individual differences in the interpretations, according to the temperament and experience of the listener, his sophistication in musical matters, his physiological well-being, immediately previous experience, etc. Musicians steeped in their own musical traditions were nonplussed when they discovered that for the layman selections in the minor key were not always sad, and that listeners who were asked to match a list of titles with a series of musical compositions made many “mistakes.” But continued analysis and experimentation brought about more precise formulation of the problems and many refinements in method.

Modern experimenters are aware that music for such experimentation must be carefully chosen since some music is not meant to have a meaning or program and such music excites little affective tone in its hearers. In certain compositions there are several well-defined moods in the various sections of the piece which have caused conflicting reports in conscientious observers. Psychologists have sometimes been too eager to simplify the materials for their experiments in order to eliminate sources of error, and they have found that when the stimuli are restricted to simple tone qualities, as for example isolated tones and produced by a singer,¹⁰ or even chords quite different in structure produced on the piano,¹¹ there is no distinctive affective character attached to them. Listeners do not agree in their interpretation of such musical sounds in isolation, and only experts who can first identify the structure of the chord will perceive the sadness of the minor or the brightness of the major chord.

Likewise it has become apparent that music arouses not a genuine knee-shaking emotional state, but rather its paler, and gentler replica which we call mood or affective tone.¹² It is a more general-

ized and somewhat more stable and lasting state and is best indicated not by descriptions of bodily states, accounts of imagery, or day dreams—since these are supplied by the listener's own imagination rather than by the music itself—but more accurately and more satisfactorily by checking quickly, while the music is still a present stimulus, a few adjectives from a conveniently arranged list. If the list is long enough to cover the most common affective states—dignity, sorrow, yearning, tenderness, calm, brightness, gayety, excitement, vigor, etc.,—varied enough to allow for individual differences, and arranged conveniently so that the exact meaning may be quickly located, data may be collected from many listeners and many compositions and may be converted very readily into quantitative records of affective reactions. Experiments of this kind show that average listeners are in very general agreement on the meaning of musical compositions, and that they follow quite accurately the intentions of the composer in so far as these may be determined.

Knowing that the meaning of music is readily discernible to the listener, it is natural to question by what means, musically speaking, he is made aware of these meanings, by the tunes or melodies, by the rhythm, or the harmony, or by other elements in the musical structure. One experimenter studied this problem by gathering together for study a number of songs, known to have one and the same well-defined interpretation or meaning, and searching among them for common elements of structure.¹³ Gundlach assembled a number of American Indian songs used in tribal ceremonies, and contrasted the group of war songs with the healing songs of the medicine men, and with the love songs. He found that the most striking differences between the groups were in the rhythms, a fact which might be interpreted as giving rhythm the place of most importance in expressiveness. War songs were faster, and lower in pitch than the love songs, and had larger ranges of tone than the healing songs.

In another series of experiments¹⁴ the effectiveness of six musical elements—mode, rhythm, tempo, pitch, melody, harmony—was explored by writing two musical compositions which differed in only one respect, for example, in harmony, or in mode, etc. Two different audiences heard the two versions and recorded their reactions, by checking adjectives appropriate to the music. Differences in the two

versions must be attributed solely to the one element which was modified since all the other elements in the two compositions were held constant in every way. Of all the factors studied tempo plays the largest part, is effective on most groups, and gives the most clear-cut and consistent result. Modality is perhaps second in importance although it has not the general usefulness of tempo since its effects are severely limited to happy-sad, and humorous-sentimental contrasts. Pitch should probably be rated as third in importance—high pitches are sparkling, playful, and low pitches sad, dignified, vigorous. Harmony and rhythm are on the whole less effective than these first three, for they show smaller majorities and cover a more restricted range of feeling tone. Simple harmonies are more happy, graceful, serene, and sentimental than complex modern harmonies. Flowing rhythms are happy, graceful, sentimental; firm rhythms give strength and dignity. The ascending or descending quality of melody, the only aspect of melody studied, proved to be of practically no importance in carrying the meaning.

Function of Form.—We have said that the problem of form in art is the central problem for psychologists, and we have discussed both the more obvious and the more subtle details of form in poetry, music, and visual art. Let us inquire next into the function of form in the aesthetic experience.¹⁵ The formal elements are without question the ABC of art, and the beginner, the amateur, should devote his first lessons to the understanding of them. Indeed there are certain schools of thought (usually referred to as Formalists) who *identify* the formal with the aesthetic. The more impersonal and nonrepresentative the art work, the more aesthetic they find it, and they tend to stress the intellectual at the expense of affective or emotional qualities.

The first function of form is to insure that the attention of the observer is fixed upon the art object. There must be a complete absorption, a concentration of attention. This will take place the more readily as more of the motor and muscular activities are aroused to activity by the form, as for example if bodily rhythms follow the pulse of the music or poetry, if by means of empathy the musculature

is drawn to follow the pose of the portrait, the imagery of the verse, or the successive stresses of the harmony. We may notice poetic forms, especially, performing this function in such works as Coleridge's *Kubla Kahn*, in Blake and Swinburne, and in Shakespeare's songs. One critic describes this class of poetry as the "spell weaving,"¹⁶ because its form has an almost hypnotic effect on its hearers.

Form will also help the observer to comprehend or perceive the art work as one unit in all its completeness. This function is not peculiar to aesthetic experience, for order and organization and pattern are necessary for all comprehension, whether of a picture, a college course, or a practical problem. Space patterns, repetitions, and rhythms help the observer to perceive, assimilate, and remember, and form therefore is a potent force in heightening the effect of mastery, of complete mastery over difficult and widespread elements.

Form will also help to create the illusion of "distance"¹⁷ in the aesthetic experience, by emphasizing the pattern, by conventionalizing materials that might otherwise seem too personal or realistic or trivial. It is the sonnet form that brings into the realm of poetry such lowly forms of life as the grasshopper and the cricket. The personal and prosaic statement "I am mentally depressed and ill" becomes in rhythmic form, at the same time more dignified and more poignant:

"My heart aches, and a drowsy numbness pains
My sense, as though of hemlock I had drunk."

But the final justification for form in art is in its function as the carrier of feeling, as the vehicle for mood and affective tone. Largely by means of suggested movement, by empathy, by the appeal to the bodily sounding board, the patterns and rhythms and repetitions give the emotional toning without which experience is flat and colorless, and bringing about that heightening and broadening of awareness which is the especial characteristic of the aesthetic moment.

STUDIES OF PLEASANTNESS

Color and Form.—There have been many experiments and studies in the pleasantness or unpleasantness of various colors and

sounds,¹⁸ but few of them have had any great significance for the psychology of beauty, because of the fact that the aesthetic quality of a musical composition or painting depends upon something other than the simple pleasantness of single colors or tones. Preferences for colors and combinations of colors depend largely upon the setting in which they are perceived, and upon qualities such as saturation, contrast, size, lighting, etc. Judgments are not stable or constant. The famous studies of the pioneer experimenter Gustav Fechner in his search for preferred dimensions of rectangles have also very little significance for the psychology of beauty. The proportions of the "golden section," the 5 : 3 rectangle, have shown much variation under different environmental conditions.

Sounds and Tones.—Studies of the consonance of tone combinations and the closely related problems of the theory of chords and chord progressions are more important. The history of music shows many series of changes in the "rules" of harmony, melody, and rhythm from the earliest times to the present day. Acceptable forms in music are different in each century. Sociologists¹⁹ and musicians²⁰ have been making attempts to relate the popularity of certain composers and forms to concurrent historical events and circumstances. Psychologists have devoted much effort to the analysis of the phenomena of consonance, and its pleasantness has been variously attributed to fusion, smoothness, simplicity, etc. The same "dissonant" chord appearing in fourteen quite different passages in musical literature, was judged to be both consonant and dissonant, and both pleasant and unpleasant, depending on the musical effect of the passage as a whole, and on the training and tradition of the listeners.²¹ Moore's²² theory that consonance is a matter of habituation and practice derives support not only from the history of music, but also from laboratory experiment. At the end of short training periods during which they had practice in hearing certain chords, the listeners preferred passages containing these chords rather than others. Farnsworth²³ has also shown that preference for endings in melodies is highly subject to training. The dissonance of one generation becomes the consonance of the next.

STUDIES IN ARTISTIC SINGING AND PLAYING

Psychologists have also contributed much to the understanding of the problems of learning in music by their analysis of the various techniques. The earliest study of this kind was made by Whipple,²⁴ and it was nothing more than a measure by measure comparison of two player piano rolls of the same composition played by two famous piano artists. The problem of interpretation yielded for the first time to analytic and objective methods. "His performance was finely poetic and subtly nuanced," writes the critic of Paderewski. "The legato passages were caressingly played, and his touch reveals the same marvelous temperament as of yore." Such eulogies are of little help to the piano student who is struggling to acquire the "marvelous temperament," but the mechanical piano rolls record the exact intensity and timing of the artist and the student may compare them with the original music as the composer wrote it. Of course any great pianist takes liberties with the music. One holds a grace note five times as long as the score indicates, and connects two succeeding measures very carefully with a smooth even tone. Another pauses carefully between the same two measures and emphasizes the pause by a staccato touch. Their styles are analyzed just as the slow-motion movies disclose the techniques of the tennis and golf stars. Subsequent studies by Ortmann²⁵ with a time and intensity recording device showed that all the effects "expressivo," "ritardando," etc., practiced by accomplished pianists are merely variations of these two factors. The Iowa Piano Camera²⁶ gives a photographic record of the beginning, duration, moment of ending, and relative intensity of each note played, and by means of it students are enabled to study the objective record of their own performance. At Iowa phonophotographic studies have been made of the violin playing and the singing of concert artists,²⁷ especially of their vibrato. The results are proving very useful in the mastery of technical difficulties of tone production.

STUDIES OF ARTISTIC CREATION

The process of artistic creation so important from psychology's point of view has not received the attention it merits because of the

great difficulty of getting the artist or composer or poet into the laboratory where he might be set to work under the experimenter's direction! Biography and especially the accounts of some artists who are adept at introspective analysis have been helpful.²⁸ Evidence leads us to believe that among artists there are as many different techniques and temperaments as among bankers, professors, or any other class of society. A study of student poets and nonpoets by means of a number of tests,²⁹ showed fewer differences than might be expected between the two groups. The poets had larger vocabularies, a more versatile imagery, greater facility at finding rhymes, and much more ability in devising figures of speech. Extensive studies of the growth of artistic development in children, and elaborate case studies of gifted children are providing insight into the creative process and temperament.³⁰

The classic notebooks of Leonardo da Vinci are valuable data on the methods of the artist. The much corrected manuscripts of Beethoven provide insight into that master's painstaking correcting and altering of his work. Occasional examples may be found in successive published editions, of changes and revisions made by poets in their original verses. Psychologically speaking, the most important study of the process of creation has been made by Lowes in his tracing of the sources of *The Ancient Mariner*³¹ through the personal history and the notebooks of Coleridge. The deliberate stocking of the mind with information and details of observation and the continuous experimenting with rhymes and meters occupied a great part of the poet's daily life. The ultimate poem is created, not at one stroke and out of nothing, but from the reading and experience of many years. Scattered through Coleridge's notebooks are ideas and observations, often the very phrases used in the published stanzas. Wordsworth, in his preface to *We Are Seven* describes the motive for the writing, and the poet's developing plans for the poem.

A most enlightening contrast in the creative process and its results may be found in two poems, *Kubla Khan* of Coleridge, and a stanza written by a woman patient of Dr. Morton Prince.³² In both cases, the author was ambitious to write verse, and had been filling his mind with techniques of meter and rhyme. In both cases the theme was one which had been dominating the thoughts and feelings,

and the actual composition was done outside the normal consciousness, that is, in a dream and with vivid visual imagery. *Kubla Khan* is a perfection of musical imaginative beauties. The other verses are sincere and dignified, but commonplace in ideas and phraseology. This striking difference in the quality of the verses is the difference between the stored minds and the experiences in poetic techniques of the two authors. The creative process is psychologically the same.

PSYCHOLOGICAL TESTING IN THE FIELD OF AESTHETICS

Psychologists have developed some very useful and excellent tests in the field of art, and by means of them have made some important discoveries and helped in the solution of many problems, although as in other fields of psychological testing the music tests have been somewhat abused. They have often suffered particularly by being overrated. The layman has expected the tests to work magic, and has been disappointed and resentful when they produce controversial evidence in certain instances. Psychological testing caught the popular fancy, and its techniques could be handled (although not mastered) more readily than many other experimental techniques. Therefore in the psychology of music and art, there is a preponderance of testing studies, and many problems which could have been better studied by other methods have been attacked only by the testing method.

There are three different kinds of tests in the aesthetic field: (1) Those designed to measure original native talent or propensity for artistic success; (2) those which measure specific achievement, or progress in artistic training; and (3) those which measure appreciation in general. There is no strict line of demarcation between these various kinds of tests, but for convenience in discussing them, we will try to distinguish between them.

Tests to Detect Talent.—Tests which could detect original talent would be particularly useful for vocational advice. If we could distinguish at the age of 8 to 10 years the children who can best profit by musical or artistic training, or if we could designate in each freshman class at any music conservatory those who will fail to win success in music, tests of the first type would be especially welcome.³³

With such aims in view the Seashore tests were devised in 1919³⁴ to measure such things as fine discriminations in pitch and loudness, and in rhythm and tempo. They measured also the span of memory for tonal patterns and the discrimination of degrees of consonance. These tests, and similar tests by other authors, have been very widely used and have thrown some light especially on such problems as differences in social culture and training, and, in so far as these differences can ever be separated from environment, on differences between races. If all the factors which enter into a successful musical career are to be measured, there must be included tests for motor coordination and speed, and in this field there are many different tests available. Tests for certain personality traits, for perseverance, temperament, etc., would also be called for, as well as measures of creative imagination, and of inventive ingenuity. No tests can be expected to measure such factors in musical success as the financial resources, the leisure available for travel, training and experimentation, or the group interests and pressures from the social milieu.

Tests for specific achievement in music and art have been devised and standardized. They measure ability of school children to read and write music, to sing accurately, to play certain instruments, and to transpose and to work out other exercises in music theory. By means of these tests children may be placed in classes appropriate to their development, and standards may be set up for the teaching of music as for teaching arithmetic or geography. There are similar tests for achievement in art, in drawing and designing.

Tests for Appreciation.—Tests for appreciation in general are somewhat different from the achievement tests, in the same way that tests for general intelligence are different from objective tests in history or geography or arithmetic. These appreciation tests attempt to measure the ability to comprehend and discriminate in poetry, art, or music. They assume that acceptable taste in art develops from ability, interest, opportunity, and experience in art just as, let us say, sagacity or reasoning ability grows out of native endowment plus specific training and practice. By means of adequate tests for appreciations of various kinds, there are psychological, educational, and

sociological problems which may be explored. Sex differences may be discovered and the relative success of teaching devices may be measured. Culture patterns may be better evaluated and more accurate descriptions of individuals and of personalities may be set up.

In making these appreciation tests the psychologist has one problem which no other maker of objective or psychological tests encounters, namely the difficulty in finding a standard for what is beautiful. For standards in art forms change from one age to another and from one culture to another, and even in one age and one environment it would be impossible to find complete agreement on the criteria of the beautiful, or on the relative degrees or steps in the scale from the ugly to the beautiful. There are no "facts" or logical "standards" in the field of art as there are in arithmetic, geography, or engineering.

There are, however, several methods of solving the practical problems of making a useful test.³⁶ One method is to offer the subject two compositions, one of them by a successful artist, poet or composer, and the other by a layman, or an amateur, and if the subject states that he prefers the work of the artist, he may be given credit for a "right" choice. In order to eliminate as many as possible of the irrelevant factors which enter into such a judgment, the compositions should be on the same subject, for example, two landscapes, or two sonnets, or two minuets, and in the same manner, that is, the classic or the romantic, the futuristic, etc. Or if the psychologist constructing the test should himself manufacture a poem, or a picture, or a piano piece which is a parody of the original, in which he tries deliberately to produce a composition of inferior quality, the standard of good and bad becomes even more stable. In some cases, the psychologist has tried to do even more than this; he has made mutilation of original compositions by altering some one quality such as the rhythm, the spatial or harmonic form, the melody (in music), or the thought (of a poem). The Oregon Music Discrimination Test,³⁷ for example, consists of forty-eight very short compositions played in pairs on the piano. The subject hears the original as it was written by Mozart, Bach, Debussy, etc., and another version in which one of four elements is mutilated—the melody, harmony, rhythm, or

form. If he repeatedly chooses the original when the form or the melody is spoiled, but makes many errors in the rhythmic and harmonic items, the psychologist may diagnose him as below or above the average for his age (according as his score is high or low), but may also state that his perception of musical pattern in form and melody is well developed but his ear for subtleties of harmony and his feeling for rhythms needs to be improved.

The pioneer experimenting of this kind was done in the field of poetry. Abbott and Trabue³⁸ devised a test consisting of twenty-six short poems, each with three new versions, one, the metric in which the movement is rendered either entirely awkward or less fine and subtle than the original; a second, the sentimental in which the emotion is falsified by introducing silly, gushy, affected or otherwise insincere feelings; and a third, the prosaic, in which the poet's imagery is reduced to a more pedestrian and commonplace level. From these four poems, the subject chose the best and the worst version. This excellent and carefully standardized test was given by the authors to hundreds of subjects in schools and colleges, and has proved to be very useful in a number of respects. They (and the similar tests for music and art) have a large usefulness in high school and college classes for the information they furnish the teacher regarding the taste of the individual pupils and the general level of the class. They also separate fairly well the adequately prepared teacher of English from the teacher whose standards in poetry are no better than those of his students. The authors learned from this test, moreover, that children prefer verses without subtlety, objective in mood, easy to understand, and in simple strongly marked rhythms, whereas poetry written expressly for children sometimes wins recognition from adults rather than from children. Sentiment in poetry is demanded by adolescents and reaches its peak in the high school years, although a liking for it often continues well into college. Recognizing that it is in the nature of adolescence to prefer exaggeration to restraint, to express their emotions overintensely, teachers may capitalize on this fact and provide for them poetry of a vigorous, unrestrained, and emotional type, but with its source always in genuine feeling, not affectation.

In all tests of this kind it must of course be understood that high scores mean simply conformity with current art standards. As civilizations and cultures change, the ideals of beauty in music, art, and poetry will also change, nevertheless these changes are so slow that the standards from one school to another or from one generation to another are relatively stable. New tests would have to be devised perhaps after several decades, but in the meantime, the present tests may serve many practical purposes. Whenever it is necessary to secure ratings from large groups, at short notice, and especially when group comparisons are to be made, tests are found to be very convenient. Not the least of their practical usefulness is their value as teaching devices, because they force the observer to concentrate his attention on the objective form, and afford him opportunity to notice details of form which he might otherwise never clearly perceive. For this purpose, the poetry test, the Oregon music test, and the Meier-Seashore Art Judgment Test ³⁹ are particularly valuable. This latter test, composed of 125 pairs of pictures, of all genres, and of many degrees of complexity and difficulty, is a self-administering exercise which would be a most enlightening experience for any observer.⁴⁰

THERAPEUTIC AND INDUSTRIAL USES OF MUSIC

Since the very early days of the century, music has been put to therapeutic use, especially as recreation for those denied a more active recreational life.⁴¹ In spite of the very wide interest on the part of musicians, most physicians are unwilling to assume responsibility for it. Undoubtedly the "prescription" must be written by a medical man who has a clear understanding and wide knowledge of mental and emotional mechanisms, and the musician must fill this prescription after the manner of a pharmacist.⁴²

The use of music to increase production and improve morale in manufacturing plants was given great impetus during the war years. There are many studies which indicate the most effective amounts and types of music to be used.⁴³

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CHAPTER XXI

POINTS OF VIEW

By MILTON METFESSEL, *University of Southern California*

In the foregoing pages of this volume you have been introduced to the vast area of human knowledge covered by the several fields of psychology. We may now view the fields together and look for problems common to all of them. Is there a system of thought which can be found to organize the facts and ideas of the separate fields into a consistent whole?

Psychologists in the past have been motivated to attempt an answer to such a question. Many problems have been encountered, with the result that different solutions have been presented. It is our task in this chapter to examine the outstanding attempts to characterize and organize psychology as a whole. Each proposed thought system represents a different point of view. Systematic points of view generally are referred to as *schools of psychology*, of which the most important go by such names as *existential*, *functional*, *behavioristic*, *psychoanalytic*, and *gestalt* or *field psychology*.

The various points of view have been developed by many psychologists. Our presentation of their work is of necessity limited, and so it is impossible to do full justice to the splendid contributions of a large number. For purposes of simplicity, then, one or two men have been singled out as representative of a system of thought.* Another limitation which we impose on ourselves can be found in our emphasis on the positive aspects of each point of view. To be sure, there are many salient differences between the various schools, but they become a matter of greater interest as one progresses in the study of psychology.

* The historical background of each viewpoint would fill volumes if treated in adequate detail. Here we can present only a few important highlights.

VIEW OF SIMPLE EXISTENCES

Edward Bradford Titchener, the great American psychologist who spent most of his productive years at Cornell University, was interested in psychology as the science of such experiences as images, sensations, emotions, and thought processes. He was a man of unusual interests, one of the few who wanted to know the nature of mental processes in and of themselves. He was more intrigued with knowing what perceptions, emotions, and thoughts *are*, than in knowing the relations they have to everyday experience.

He regarded all mental processes as existences. He did not think that *mind*, in the common-sense meaning of the term, was immaterial and spaceless, subject to laws of its own which are different from other laws of nature. The common-sense view of mind is illustrated in the following example: A woman comes to a physician and complains of an illness. The good doctor gives her all the tests known to medical science, and finally tells her, "There's nothing wrong with you. It's all in your mind." In order to understand what Titchener meant by mind, we shall turn to the ideas of Ernst Mach, a respected Viennese physicist of the last century.

Science and the World of Experience: Mach's View.—

Mach stated that all the sciences have the same subject matter, the world of experience. The physicist's instrument, the biologist's organism, the botanist's plant, and the psychologist's self are experiences. All objects, bodies, and selves are complexes of simple existences, or what Mach called "sensations." They are colors, spaces, times, heats, sounds, and the like. Sometimes these "sensations" are connected in semipermanent forms which common sense regards as objects, bodies, and selves. Mach drew a picture of himself in his study, as the scene appeared with his right eye closed. He pictured part of his nose, his moustache, arms, legs, and trunk in the setting of tables and bookshelves. Mach regarded all information he had of the *self* as the same kind of information he had of objects, namely, the information of sensations. Common sense distinguishes between objects and selves by different relationships of the sensations comprising them, and not by the sensory elements themselves.

These sensory elements are the same for physics, biology, and psychology.

Becoming One with Subject Matter.—The simple existences, which are the data for all sciences, are meaningless. There are examples in the literature of primitive peoples who sit for hours, wide awake, yet passively living their environment. Perhaps you have been at a rivers bank, and you became so absorbed in your surroundings that you were no longer aware that there were things called trees and rocks. You became one with your environment in a wordless, objectless, meaningless existence. Your experience was one of sensations without any reference, according to Mach's view, and you were in the realm of *existential experience*.

Psychology as a Separate Science.—If the data of all science consist of these meaningless separate existences, what then distinguishes the objects of physics and the objects of psychology? Consider another example. Suppose that you wrote a description of the scene at the rivers' bank. You would not have written it in terms of the simplest existences, but rather of objects and events. You might have mentioned green trees, the multicolored water, the sunlight shimmering on the eddies, the little whirlpool over at the left, and the white spray as the water dashed against the rock. You might have recounted the stirring of the wind above you, the roar of the rushing stream, and the discordant blast from an automobile hidden by the trees of the other side. From such a description, it is apparent that you were thinking of objects and events separate from yourself. Nevertheless, your direct information was from your experience of visual and auditory sensations. A tree was experienced after light waves from the sun were reflected to your eye, and nerve currents carried energy to your brain. A tree is a physical object when you regard your experience of it as dependent upon the sunlight, and it is a psychological object when you think that it is dependent upon the activity of the nervous system. As Titchener points out, an object is physical or psychological according to your point of view.

Titcheners' definition of psychology thus became "the science of existential experience regarded as functionally or logically dependent upon the nervous system (or its biological equivalent)." ¹ By "functionally dependent" he meant that the experience varies when the activity of the nervous system varies.

As Titchener conceives it, the subject matter of psychology is not the activity of the nervous system, but the experience which is dependent upon it. Mind is the sum-total of all the experiences so regarded. Consciousness is a cross section of mind, at any given moment.

Description in Simplest Possible Terms.—The first task of an existential psychologist is to describe experiences in the simplest possible terms. Such a description is called an *introspection*. There must be a sampling of all manner of experiences, from sensations to higher thought processes. Can a thought process be reduced to simpler mental processes? Titchener's answer was in the affirmative, for his analysis showed that the thought process is made up in part of images. Thus numerous experiences are worked over introspectively, splitting them up into component parts until further analysis is impossible. When a mental process cannot be further divided, it is an elementary mental process.

At best introspection is an arduous and difficult task. Living as we do continually in a world of objects, there is always the danger of referring the experience to a physical object. If a student is asked to analyze the contents of his thoughts into simple existences, he is quite likely to state *what* he was thinking of: A trip to Europe, or a good night's sleep. An existential psychologist wants to know the mental processes that went into the thought trip-to-Europe: Visual images, muscular sensations, and so on.

Analysis of an Emotional Experience.—Titchener has given us the following example of how an experience can be divided into various mental processes:

Suppose that you are sitting at your desk, busy in your regular way, and obscurely conscious of a rumble of a car that is passing down the street; and suppose that the rumble is suddenly interrupted by a shrill scream. You leap up, as if the scream were a

personal signal that you had been expecting; you dash out of doors, as if your presence on the street were a matter of imperative necessity. As you run, you have fragmentary ideas: 'a child,' perhaps, in internal speech; a visual flash of some previous accident; a scrap of kinesthesia that carries your whole attitude to the city car-system. But you have, also, a mass of insistent organic sensation: you choke, you draw your breath in gasps, for all the hurry you are in a cold sweat, you have a horrible nausea; and yet, in spite of the intense unpleasantness that floods your consciousness, you have no choice but to go on . . . the mental processes that we have just described make up the emotion of horror.²

There were perceptions of various phases of the whole situation, ideas, memory, attitude, kinesthetic sensation, organic sensation, and unpleasantness. Which of these can be reduced further? Titchener suggested that attitude was made up of kinesthesia, or muscular sensation; that memory of a previous accident was a visual flash; and that the idea was made up of the combined muscular sensations and auditory images of a word, *child*.

The Simplest Psychological Existences.—From many such experiences, Titchener drew the conclusion that there were three classes of elementary mental processes: Sensations, images, and affections. These are the simplest items in the existential world regarded as dependent upon the nervous system. Titchener found that he could describe every perception of meaningful sights and sounds as groupings of simpler meaningless mental processes of sensation. Sensations were therefore the characteristic elements of perceptions. In every idea which he analyzed, he always came across a process called an image; and in every emotion, he found pleasantness and unpleasantness, which taken together he called affection. He found that any given moment of experience was an exceedingly complex array of mental processes. Even perceptions, ideas, and emotions have to be singled out from each other in the total experience, before their own nature can be examined, and an analysis made into sensations, images, and affections.

Classification of Mental Elements.—Someone told Titchener that if he reduced all mental life to simple existences, it would be impossible to classify them. Titchener replied that, although the

mental elements are simple, they are still actual processes, and as such, they have various aspects or attributes. A sensation can be defined as a mental element with at least five attributes: *Quality*, intensity, clearness, duration, and extent. Sensations can be grouped on the basis of these attributes. *Quality* is that attribute by which one sensation is distinguished from another. For example, a violin tone is distinguished from the sight of the violin and musician by quality of sensation. Another attribute is *intensity*. One sensation is greater than, or more than, another sensation. A third attribute is clearness. In a given experience, some sensations are vivid, others vague. A fourth attribute, *duration*, is the basis for an analysis of the variations of a sensation in the passage of time. The attribute of *extent* is the basis for the size of things, in fact, for all space perception.

Titchener also classified experience with reference to parts of the body, such as muscular sensations from the vocal organs, or from the eye. Another means of classifying uses the stimulus as a reference point.

Existential System of Thought.—Science can know no other world than the world of experience, and psychology shares that world with other sciences. Psychology, however, is concerned only with those experiences which are immediately dependent for their nature upon the nervous system. Pure science describes in the simplest possible terms, and considers each item as isolated, and therefore meaningless. One cannot describe the nature of any object or event if ulterior objects and processes enter into the description. The simplest possible terms in which existential psychological experience can be described are sensations, images, and affections. These are the elements into which all mental furniture can be divided. They can be classified according to their attributes, by reference to parts of the body, or by their stimuli.

VIEW OF ADAPTATION TO ENVIRONMENT

The idea of evolution, originating in biology, was carried over into psychology. Whereas biology was interested primarily in the relation of bodily features to the preservation of life, psychology

inquired into the role of consciousness in adaptation to environment. Sense organs, muscles, nerves, and glands contributed to the continuation of life, but did not conscious processes provide important means to the same end?

The Adjustment of Inner to Outer Relations: Spencer's View.—This viewpoint came to be known as functional psychology, since the whole field was organized in terms of the ways in which consciousness functioned for the welfare of the living being. Herbert Spencer, an Englishman, was one of the first to lay the foundation for such an organization. He thought that our understanding of psychology was not a matter of what went on in consciousness alone, but that the environment had to be taken into consideration. All events inside the organism, or internal relations as he called them, were in some way connected with external relations, or the environment. Mental life, no less than bodily life, was a continual adjustment of the internal relations to the external relations.

Environmental Demands as Met by Reflex and Automatic Acts.—Human beings are equipped by heredity to make certain adjustments to the environment without a long process of learning. One of the simplest examples of the adaptive process is the eye-wink reflex. If an object is thrown toward your eye, in a split second the lid closes as a protective gesture. Then there is the reflex which automatically makes possible adaptation to strong light by shutting out some of it, and to weak light by admitting more.

Automatic acts, such as walking, talking, writing, and driving an automobile, when learned, at first occupy a considerable portion of attention. We are conscious of the acts themselves as we learn them. It is fortunate that we do not have to devote as much attention to these acts all through our lives. Having learned to go through the movements of typewriting, we no longer pay any attention to those movements, and we are left free to concentrate on the thought of what we are writing.

Consciousness as a Part of the Adjustive Processes of an Organism: Angell's View.—Much of what we do day in and day

out is of a routine nature. Consciousness steps out of the picture when its function is no longer needed. James Rowland Angell, for many years President of Yale University, pointed out that consciousness becomes a "master device" in adjusting to the environment, when hereditary acts or learned automatisms fail us.³ Nature did not make of man a creature adapted to all possible environments. If you are driving your automobile, turning of the wheel, foot action on the accelerator, etc., are a complicated coordination of movements, which you leave to your nervous system for successful operation. While driving in situations which are not dangerous, you may forget that you are driving an automobile. If, however, another car looms up unexpectedly, you quickly become aware of your driving and consciousness comes to your aid to help you out of the situation.

Since we never reach a complete and final adjustment until death, we have a recurrent series of one adjusting process after another. As a result our conscious processes are frequently called into use to assist in making adjustments. Both bodily and mental life cooperate—the entire organism is involved.

Uses of Emotion and Feeling.—Angell's point of view of the way in which conscious processes function in the interest of man's survival can best be illustrated by his treatment of emotion and feeling. Darwin made exhaustive observations of various emotional attitudes in men and animals, and tried to trace the value in adjustment of screams, growls, tense postures, and erection of dermal appendages such as hair and feathers. An animal's strong and harsh cry of rage had a possible value of frightening an adversary. In civilized man, the value of such emotional expressions is probably less than in animals.

Intense anger and fear do serve us, as Angell points out. They represent a compelling break in the continuity of our mental life, and make us acutely aware of a crisis and the necessity for an adjustment to it. Angell's idea was that a strong emotion appeared when there was a conflict between normal impulses arising out of special situations.

The feelings of pleasure and displeasure connected with emotional life are by nature tied up to the purposes of the organism. According to one view, if our mental activities move along unimpeded toward a given end, we feel pleasant. If, for any reason, there appears a thwarting of progress toward that goal, we feel unpleasant.

Summary.—According to functional psychologists consciousness can be separated into sensory processes, acts of memory, imaginings, reasonings, feelings, and the like. The nature of these processes, however, is influenced by the neural activities as a whole. Consciousness should be understood as one of the devices by which man adapts to his environment, cooperating with bodily life when nonconscious activities fail. Conscious processes are organized with reference to adaptation to the environment.

VIEW OF STIMULI AND RESPONSES

We have seen that existential psychology is limited to our “internal” experience, although it uses the “external” world for purposes of classification. Functional psychology is colored throughout by the adjustive relationship of consciousness to the environment. A third view leaves out all reference to experience or consciousness, and confines itself to a study of the relationship of various stimuli which impinge on an organism to the responses made by that organism. It is known as behavioristic psychology.

Animal Learning: Thorndike's View.—At the beginning of this century, some of our psychologists were occupied in researches on instinct and learning. They found that they could control their experimental situations much better with animals than with human beings. Edward L. Thorndike, the famous Columbia University psychologist, was one of the early experimenters on animals. His classical experiment with a kitten learning to escape from a box is a good example of stimulus-response psychology.⁴ The stimulus for the animal was a box with a door which could be opened to get a piece of fish. The response necessary to solve the problem was turning a button. The kitten made a large number of movements with paws, mouth, and other parts of his body. Most of them were useless

movements. Some of the promiscuous movements were made at the button, and the door opened. The next time the kitten was put in the cage, he did not go immediately to the button, but repeated his first performance of useless movements. However, some of the useless movements were eliminated, since the kitten took a shorter time to get out. As the trials were repeated, more useless movements were dropped out. The connection of the appropriate response to the confinement stimulus was gradually strengthened, or in Thorndike's words, stamped in.

Conditioned Reflex: Pavlov's View.—A Russian experimenter, I. P. Pavlov, arrived at the notion of the conditioned reflex from his experimentation on dogs.⁵ The salivary reflex is a natural reflex for which the adequate stimulus is food in the mouth. A bell is not a natural stimulus for its occurrence. By presenting repeatedly the sound of a bell shortly before the dog was given food, he found that the bell did become a stimulus for the salivary flow. Any reflex is called *conditioned* when a stimulus other than the original one consistently evokes the response. There are changes in the total pattern of the reflex during the process of conditioning. Pavlov found in the conditioned response a cue for the many experiments he later performed on learning, sleep, and neuroses.

Subject Matter of Animal Psychology Cannot Be Revealed by Internal Observation.—It is obvious that an animal cannot make observations of his experience, and report them verbally to a scientist. Thorndike and Pavlov had to speak of learning objectively in terms of stimulus and response, whereas previously it had been described as subjective association of ideas. The techniques which the animal experimenters used were valuable in studying the nature of learning.

Psychology Studied in Other Persons: Meyer's View.—Since the methods of animal psychology were so successful, they were applied to human beings. In a book entitled *Psychology of the Other One*,⁶ Max Meyer contended that the study of psychology would be more objective and scientific if the psychologist left him-

self out of the subject matter. Besides believing that the consciousness of the psychologist should be eliminated from the study, he doubted that consciousness could be studied in other people, because he considered it to be a personal matter. He suggested that the whole of our psychology could be written without any recourse to consciousness. For instance, in place of thought, we can study language; for the symbols of thought are subjective and personal, while those of language are objective and social. Likewise, it is unnecessary to say that an animal moves about in search of food because he is hungry, since the word *hunger* refers to an animal's conscious state. Meyer states that it is more consistent to say that such an animal moves about because there is no food in the digestive cavity. The movements, food, and digestive apparatus all belong to the same category of objective realities. This attitude may be clearer if we consider our objections to stating that a plant grows roots into the ground because it is hungry.

Measurement of Responses.—Meyer pointed out that the great discoveries of science have been made when the scientist restricted his descriptions to that which he could measure. When we measure, we use sense organs, primarily our eyes. As far as is known, our sense organs cannot receive our conscious experiences, and consciousness is not directly measurable. With responses, however, behaviorists tells us that it is different. We can measure the action of muscles and glands, and later determine their significance to us.

Sufficiency of Response Information.—Although a muscular response is a result of a stimulus, it is not an immediate result. Before a muscular response can take place, nervous excitations have to travel from sense organs to the central sections of the nervous system and then to the muscles. In the solution of many psychological problems, however, it is possible to disregard the intermediate nervous excitations. One example is to be found in the relation of reaction time to traffic accidents. One of the first things studied with accident-prone drivers is the time it takes for them to push down on a brake pedal after a stimulus has been given. If a driver shows that he is slow compared to others, or that he is highly

variable, fast at one time and slow at another, it is not necessary to find out what went on in the sensory and motor impulses of his nervous system.

The Stimulus-Response Formula of Watson.—John Broadus Watson is the psychologist who is most often associated with the behavioristic viewpoint.⁷ His keynote for psychology is, "Given a stimulus, to predict a response." Man's actions occur in a world of law and order. It is admitted generally that what any given individual does can be traced in part to preceding conditions in his life. It is from these preceding stimuli that we can predict some human behaviors with sufficient certainty even by common sense. To be sure, our predictions are not perfect, but we rely on them. A bank cashier predicts that the loans he makes will be repaid. A personnel manager predicts that individuals of his choice will be successful in the places to which he assigns them. As we become closer acquainted with a friend, we can better map out in advance what he will do in any given situation.

Summary.—The behavioristic viewpoint emphasizes the study of measurable movements of an organism in relation to the stimuli preceding those movements. The subject matter of psychology consists of activities, and those activities can be organized according to the formula: Given a stimulus, to predict a response. Behaviorists hold that the facts of psychology can be ascertained in objective terms, and that a description of consciousness is not essential.

VIEW OF UNCONSCIOUS PROCESSES

A group of European scientists, dealing with the troubles of people, found that many of the strange and irrational occurrences in the lives of unfortunate people could be organized systematically. They looked for explanations in what they sometimes referred to as the subconscious, which contained those events which never reached the surface of consciousness, but which influenced conscious life to a considerable extent. They probed into the not-at-all calm and serene emotional depths of their patients' lives.

Hysteria: Charcot's View.—A celebrated French neurologist, T. M. Charcot, made extended studies of people who were paralyzed in their legs, who could see only one word at a time, who had distortions of their faces, who had loss of sensations in their hands, and who complained of strange pains in different parts of their bodies. As a result of this work, he learned to distinguish between paralyses which had some physical basis, and those which did not. It is primarily to Charcot that we are indebted for a searching of psychological facts to account for hysterical symptoms of paralyses, anesthesias, contractures, and the like. Before the days of Charcot, tongue muscles were incised as a cure for stuttering, operations were performed on the neck to eliminate stiffness, and in other ways surgery was resorted to in an attempt to relieve what Charcot found to be psychological.

Dissociation of Consciousness: Janet's View.—One of Charcot's students, Pierre Janet, Professor of Psychology in the College de France, has given an interesting account of a hysterical case. A thirty-two-year-old man was confined in a hospital bed, because he could not move either of his legs, when he was awake and conscious. At night, however, when he was asleep, he jumped with agility out of bed at times, grabbed a pillow, and spoke to it as though it were his child whom he was protecting from his mother-in-law. He then fled out of the room with the pillow, went to the top of the hospital building, running at an unusual speed. The attendants had to exercise great care in catching him, since when he was awakened, both of his legs again were paralyzed. When informed of the episode, after he was carried back to bed, he could not believe that such an experience happened to him. All those events did not exist in his conscious life, but while running in his somnambulistic state, he evidently was guided by sensations of doors, hallways, the pillow, and the roof of the hospital.

Janet tells of other hysterical cases: Those who had double existences, at one time being one personality, and at another time, being an entirely different person; those who forgot who they were and awakened in a strange place; those who lacked sensitivities in hands or entire arms; and those who saw only a small central part of the

field of vision, since called "tunnel vision." He came to the conclusion that in each of these instances there was a restriction of consciousness. He decided that in hysteria the patient had a lowered psychic energy, and as a result of the exhaustion some part of his consciousness was broken off from the totality. Under certain conditions, that part broken off would function, as in the case of the paralyzed man who fled with the pillow, but at that time only those perceptions and ideas which related to the dissociated part would be reacted to by the patient.

Neuroses and Sex.—Charcot had noticed that persons suffering from neuroses generally had some difficulty in their sexual life. However, it was Sigmund Freud, another of his students, who saw the significance of Charcot's observation. He proceeded to make use of the relation of neuroses to sexual difficulties in his treatments. He found that the patients were ashamed to discuss these troubles, but that once they could be brought to recall their past experiences along this line, a sort of mental catharsis took place, and the neurosis was relieved.

Freud found that the recollection of these troublesome experiences was an exceedingly difficult task. He became convinced that his patients had actually forgotten the original sexual episodes. He also was satisfied that it was those forgotten experiences that somehow were the cause of the neuroses. What was the process by which these vivid emotional experiences were forgotten? How did they possess a strange power to change an entire personality?

In building a psychological system to answer these preliminary questions, Freud adopted a picturesque terminology.⁸ He conceived of the personality, or psyche, as being partly conscious, and partly unconscious. We are aware of the external world and certain aspects of ourselves, but we are ignorant of the deeper and more powerful forces of our personalities. That great region of activity within us of which we are not aware is the unconscious. A patient who forgot a crucial incident in his life, Freud decided, had driven it from his conscious system, which permits of ready recall, into his unconscious. Freud called this *repression*.

Id, Ego, and Superego.—In order to explain repression, Freud made use of three agents of the psyche, which he termed the id, the ego, and the superego. The id, or it, is the unconscious home of the instinctive impulses. It strives powerfully to find expression in some form, but by itself it is primitive and unorganized, and cannot determine the manner of its expression. It is the ego, which is the organized part of the psyche, which guides the particular outlets of the forces of the id. The ego depends for its existence upon the perceptual system, by means of which we are conscious of the external world and ourselves. The superego is that part of the psyche which harbors ideals of conduct, somewhat similar to the conscience. These are the three players in Freud's drama of life, and the setting is one that spells battle.

The Ego and Conflicts.—The ego is the buffer between forces of the id and the superego. The ego controls all forces which enter consciousness and which lead to action. It makes an attempt to remain peaceful and organized in the conflict between the id and the superego. It is the ego that accounts for the repression of instinctive strivings in conformity with the dictates of the superego. The phenomenon of repression reveals the relationships of the ego and the id. Although in some instances the ego and the id are distinctly separable, it remains that the ego developed out of the id. Not all of the ego is conscious. Freud found that many patients were not aware that they had repressed any vivid experience. That aspect of the ego which functions in repression is therefore sometimes unconscious.

It would seem that the ego possesses power in its own right, if it can conquer an instinctive impulse by repressing it. Freud explains that repression actually reveals a weakness of the ego. The forces in the id, baffled by the ego in their attempts at expression, are not content to remain idle and defeated. The repressed process appears in the form of a neurotic symptom, and enjoys a gloating existence outside of the ego-organization. For instance, one person may develop a compulsion to wash his hands, and during the course of a day, he may repeat the process many times, even though his hands

are clean. Compulsive handwashing to Freud is a neurotic symptom which defeats in a way some prior repression by the ego.

The Pleasure Principle and the Reality Principle.—As Freud describes it, the id is dominated by the pleasure principle, which is that force in the individual that attempts to secure immediate gratification of instinctive cravings. The id, because it is unconscious and unorganized, cannot become aware of dire consequences which may result from gratification. It is the ego, possessed of a knowledge of social precepts and future consequences of many kinds, called the reality principle, which acts as a temporary check upon the forces of the id.

Anxiety and the Pleasure Principle.—By itself, the ego is often in a state of helplessness, particularly in the face of danger. It may experience danger either from some external object, or from some forces in the id. When some repressed instinctive power seeks expression, the ego feels afraid but does not know of what it is afraid. Thus arises the feeling of anxiety, which seems meaningless or irrational but none the less real. Freud says that the anxiety states are reactions to distress signals sent out by the ego to the all-powerful pleasure principle. The pleasure principle cooperates with the ego by leaving that particular force of the id as such under ego-repression, but forces it out in some queer behavior, uncontrolled by the ego. In the case of handwashers, the feeling of vague anxiety calls forth cleansing the hands, which is pleasant, and both the danger and anxiety disappear for a time. Handwashing does not bring out a conflict with the superego, which the direct action of the id's impulse would have done.

Motivation from Within the Individual.—It is apparent that much emphasis is placed by Freud upon the driving forces submerged in the unconscious. In the *id* Freud originally proposed two distinct tendencies, sexual instincts and ego instincts. The latter primarily were the instincts of self-preservation. The sex instincts were always directed toward a particular object. When a particular attachment to a certain object was repressed, the sexual impulse or *libido* trans-

ferred itself to another object. Thus arose the principle of *transference*. When he found that many individuals turned their love to themselves (*narcism**), he argued that the libido had then found its love object in the ego.

Life Instincts and Death Instincts.—For this reason he could not find a conflict between the ego instincts and the sex instincts, since the ego instincts sometimes became servants of the libido. He then combined the instincts of self-preservation and species-preservation into the single concept of *Eros*. He did find, however, that there was an instinct separate from *Eros*, and he called this the death or destruction instinct, which operated in silence. *Eros* and the death instinct work in opposition to each other, forming a psychic polarity in the unconscious.

The death instinct accounts for tendencies to suicide in some individuals, and *sadism* (the torturing of a loved one) in others. All impulses tending to destruction and hate fall into this category.

Infantile Sexuality.—All the time Freud was evolving the concepts of id, ego, superego, repression, transference, *Eros*, and death instincts, he was utilizing these concepts in his work with neurotic patients, which involved first of all the recall of the experiences that had been repressed. He applied many methods in his attempt to overcome the resistance of the ego. He used hypnosis, which Janet had used with some success. He had his patients talk for hours, over periods of time, limiting what they said to matters pertaining to their unhappiness. One procedure, for which Freud became famous, was his interpretation of dreams. During dream states, he thought, the repressed desires appeared in strange guises. Out of this work there came a study of symbolism, in which objects and events in dreams were understood to stand for sexual events or objects. He also studied lapses of memory, slips of the tongue, and queer mistakes people made which they could not understand, but which Freud interpreted as a disguised expression of a repressed force in the id.

By these methods, Freud frequently was successful in reviving an experience which he determined to his satisfaction was connected

* Old spelling *narcissism*.

with the neurosis. However, one repressed experience, when brought into consciousness, gave evidence of another such experience farther back, and Freud had to continue his probing into the unconscious. He would usually wind up in experiences dating back to infancy. Libido finds its earliest expression, according to Freud, through oral and anal stimulation. Later it moves outward and becomes attached to persons and objects. The persons involved, in his theory, are generally the parents of the child. Love of boy for mother, and girl for father, give rise to the Oedipus complex, and the Electra complex, respectively. The child realizes he cannot become a substitute for the parent, and a conflict ensues which results in repression. Throughout infancy all efforts at libido expression are met with, first, an outer, and second, an inner resistance. These experiences Freud found to be the original source of the trouble.

Summary.—Freudian psychology, concentrating on the relationship between conscious and unconscious processes, divides the psyche into three interacting entities, the id, the ego, and the superego. The id is the unconscious part of the psyche, and contains two warring instincts, the life instinct at one pole and the death instinct at the other. Dominated by the pleasure principle, it lacks the organization to determine the specific outlets for the impulses. Those outlets are primarily a function of the ego, which grows out of the id, and in its organized part, has a separate existence from the id. The ego strives to keep the conscious life of an individual organized. Growing out of the ego, because of early sexual repressions, is the superego, somewhat akin to conscience.

VIEW OF ORGANIZED EXPERIENCES

In Titchener's view of existential experience, our everyday world is reducible to three simple, ultimate existences: Sensations, images, and affections. In Germany, a group of psychologists, most prominent among whom were Max Wertheimer, Wolfgang Köhler, Kurt Koffka, and Kurt Lewin, came to regard introspectively analyzed sensations, images, and affections as artificial. We should study our experiences, they say, but we should recognize the natural patterns

into which our experiences fall, and then we should determine the conditions under which the natural patterns appear.

Experiences of the All of Objects and Events.—Think for a moment of your experience of this page of print. You can analyze it into sensations of blackness, whiteness, pressure, and the like, if you are a good introspectionist. Nevertheless, before and after the analysis, your experience is an organized totality, for you then are not aware of elementary mental processes. You are experiencing a page of print in its entirety. A perception of *all* of it, as such, possesses for you a strong reality. This book we regard as something which does not depend upon us for its existence. We can leave the room, and believe that the book is still here. We can find it when we return. We open it, close it, put it on the shelf, walk away from it, and it remains the same book to us.

Objective and Subjective Experience.—Köhler called those experiences of the *all* of objects and events, which appear as actualities outside of us and independent of us, *objective experiences*.⁹ There are other experiences which we do not refer to the outside, but which we regard as personal and inside. We have experiences of muscular strain, emotions, and memories. They are our *subjective experiences*.

We can come to regard outside objects as experiences within us, as Titchener did, but Köhler reminds us that our ordinary experiences of things and movements have a strong and natural objectivity. The allness and the externality of chairs, books, and even sounds have been present to use from early childhood. A case in point: A physicist tells of an experience of his five-year-old son, at the time of an earache. "Can't you hear that ringing sound?" the boy asked his father. It was difficult for the child to understand that the ringing came from processes in his ear and not from some external source, since sounds which he had heard in the past could be heard by other people and were not a personal affair with him. It is still another step removed from naïve experience to think that sounds which can be heard by others, that is, external sounds, are also processes inside one's head.

Although most of the work of Köhler to date has consisted of studies of objective experience, he recognizes the place of subjective experiences in psychology. Instead of analyzing objective and subjective experiences into sensations, images, and affections, Köhler believes that the task of psychology is to study the patterning of all experiences. He saw an outstanding characteristic of experience in its organization into wholes. The view which emphasizes the organized wholes of our experience has been called the *gestalt* view. The nearest English words to *gestalt* are *configuration* and *pattern*, but they do not carry the precise meaning, so the word *gestalt* has become a part of our English psychological terminology.

The Whole Is Different from the Sum of Its Parts: von Ehrenfels' View.—Christian von Ehrenfels, an Austrian philosopher, was one of the men whose works form the background of the *gestalt* view. von Ehrenfels was interested in music. The idea current at his time was that a melody was a sum-total of the notes comprising it. He wondered why a melody played in one key remained the same when played in another key. When transposed, the sensory parts comprising the melody, that is, the notes, were all changed. The melody, he concluded, was a quality of the whole sequence. von Ehrenfels' idea was that experiences had many qualities as-a-whole, and such qualities disappeared when those experiences were broken up into parts. Likewise, he believed that, when we add together the parts of an experience, we do not arrive at whole-qualities. The whole-qualities are independent of the parts, in as much as the parts may be changed and the whole-qualities still remain identical.

However, von Ehrenfels regarded the whole-qualities, such as melodies, as new elements added to the sensations of the notes making up the musical composition. We have both the sensory elements and the whole-qualities, which are added by thought processes. Köhler and other *gestalt* psychologists later came to the opposite conclusion that wholes were the primary and immediate sensory data and that elements, such as simple sensations, were products of abstract thought that came afterward. This view can be traced to the inter-

pretations which Wertheimer gave to his famous experiments on the perception of movement.

When you see motion pictures, there is no movement on the screen. If Irene Dunne seems to walk from a chair to a table, the pictures which are thrown on the screen in rapid succession to produce the action do not in themselves have that movement. The pictures are still photographs of successive positions. Why, then, do we see movement? For experimental purposes, we can illustrate what happens by arranging a situation which involves two alternately flashing lights. There is no light in the space between them, but under stipulated conditions a brief flash of one followed by a flash of the other will appear as a light moving. If the conditions are optimal, there will be a perception not of two lights, but of one light in motion. This is called the *phi phenomenon*. It is obvious that the movement cannot be described as two elementary sensations of light. The movement is not in the lights. According to gestalt theory, the movement involves the same organized brain processes which are occasioned if a light moves in space.

Wertheimer saw in the phi phenomenon a new principle in psychology. It was an organized experience, divorced in nature from any elementary sensations. The organization occurred because of dynamic brain processes, forces interacting with each other and forming unitary experiences. Wertheimer believed that what was true of the phi phenomenon was also characteristic of other varieties of experience.

Constancy of Size.—Thus, as Köhler conceives it, stimulation is not organized dynamically, but the nervous system organizes segregated wholes in accord with the world of physical objects. Consider the fact that an object remains the same size to us, even though we change our distance from it. In order for you to see this book, there must be light reflected from it to your eyes. There is an image of it on your retina. If you hold it one foot or two feet away from your eyes, it appears to be the same-sized book. Nevertheless, on your retina it is twice as wide at one foot as it is at two feet. Although your experience of the book must come from that retinal stimulation, your perception of the size of the book does not corre-

spond to it, but rather to the actuality in the outside world—the book measures the same whether it is one foot or two feet from your eye. It is possible to think that the book remains the same because the total organization in the brain remains the same, even though the sensory stimulation from the book is changed.

The Gestalt Formula.—Köhler elaborates the stimulus-response formula for psychology into: *Constellation of stimuli* → *Organization* → *Reaction to the results of organization*. Thus far in this discussion we have concentrated upon the first and second terms of the formula. The gestalt psychologists have contributed to numerous fields of psychology, including that of reaction and behavior. The behavior of another person is regarded as a segregated whole of the sensory field, primarily visual, in the objective experience of an observer. Köhler cites many examples in which there are similarities in organization of the subjective and objective experience of the same behavior. One instance which he mentions is the behavior of a pianist playing a sonata. The organization of the sonata is present in the subjective experience of the pianist, such as a *crescendo* followed by a *ritardando*. The activity of his muscles in playing conforms to the organization. The resulting sound waves are grouped in the objective experience of a listener in a similar manner to the grouping in the subjective experience of the pianist. In crescendo, the subjective and objective experience of the behavior both have a whole-quality of *swelling*.

It is not implied that the precise elements in the subjective experience of another individual are revealed by behavior observation. Köhler is speaking of the whole-qualities, which gestalt psychologists say can have varying or interchangeable elements.

Köhler's Study of the Behavior of Apes.—The gestalt psychologists have found evidences for their view in numerous experiments on perception, learning, memory processes, and emotions. One of Köhler's famous studies on the mentality of apes is a sample of the kind of experiments performed. The tests had many variations, but in one instance Köhler suspended a banana above the reach of the apes.¹⁰ Near by, but not directly under the banana, was a box.

Six apes were placed in the room, and at first they attempted the impossible task of reaching the banana by jumping. One of the apes, named Sultan, ceased jumping and paced about the room. Suddenly, he stopped next to the box, pushed it to a spot sufficiently near the banana so that, by a leap, he was able to grasp his reward. Only a few seconds after Sultan stopped near the box, he had secured the banana. None of the other apes had noticed the box. From Sultan's behavior, Köhler concluded that the ape had surveyed the situation as a whole. Suddenly, he saw the connection between the box, jumping, and the banana, and the problem was solved. Insight is the term Köhler applies to an experience of the total field when a pattern appears in which certain parts are felt as dependent upon other parts.

Recapitulation.—Gestalt psychology emphasizes the organized wholes of experience, which have properties not contained in the sum total of the parts. The nature of the parts is dependent upon the whole. The formula for psychology, according to Köhler, is *Constellation of stimuli*→*Organization*→*Reaction to results of organization*. Light waves and sound waves striking the eye and ear are not dynamically organized into segregated wholes. Such an organization takes place in the nervous system, which reconstructs the units of the physical world, after their unitary nature has been temporarily lost en route. To a whole of experience there corresponds a functional whole in brain processes.

CURRENT VIEWS EMPHASIZING METHODOLOGY

In subject-matter theory an attempt is made to develop facts and laws pertaining to *what* we study. In methodological theory, which is concerned with *how* we study, rules of procedure for logic and experimentation are made explicit. Grounds for acceptance of facts and laws in psychology are found in the rules of procedure.

The points of view just considered were primarily attempts to lay out the subject-matter domain of psychology within the sciences. In recent years there have been developed extensions and revisions of each viewpoint which have emphasized methodological princi-

ples. Statements of (a) the nature of a psychological experiment, (b) logic, and (c) empirical methodology have been explicitly included. The intimate relationship of methodological theory to subject-matter theory has been made more evident as the two have been more carefully separated and considered.

Watson, the behaviorist, in his objections to the viewpoint of Titchener, the introspectionist, raised a methodological question. He objected to the use of an existential analysis of mental life as scientific evidence.

What are the grounds on which such an existential analysis is offered for scientific acceptance? The implication of the introspectionist was that what he reported about his mental processes was correct and unimpeachable. Yet the reports of inner observations frequently were conflicting from one introspectionist to another, and in terms of introspective reports alone there was no way to resolve the difficulty. In one sense personal inner observations are not verifiable by others. Technically we cannot directly observe the mental processes of others. If observational evidence is restricted to what an individual reports verbally, his statements cannot be checked by other scientists. Consequently the method of authority received over-emphasis among introspectionists. An internal analysis of mental life tended to be judged correct or incorrect in terms of the psychologist who reported it.

Operational Definitions.—Two Harvard psychologists, Boring¹¹ and Stevens,¹² taking a cue from Bridgman,¹³ attacked the problem of existential analysis in terms of the methodology involved in the definition of perceptual terms. What do words like “red” and “pitch” which in Titchenerian psychology referred to conscious events, mean in the experimental framework?

In a psychophysical experiment, the traditional procedure was to hold constant all variables except one. The variables were physical, and the experimental conditions were observable and verifiable by any trained scientists. As an example, in a study of pitch discrimination, the experimental design required that all properties of the

sound stimulus be held constant except frequency of vibration. Under such conditions, if an individual consistently would report variations within him to which he would apply the words "higher pitch" or "lower pitch," then his report of internal events would be verifiable. The relation of physical frequency of vibration and psychological pitch would be one of material equivalence. The term referring to internal processes (such as pitch) had the status of a construct defined in terms of experimental operations.

Discrimination.—Stevens utilized as evidence of internal events the operation necessary for all counting and measurement in science, namely, discrimination. In a discrimination experiment, the design requires a differential response by the participant. The only relevant cues available to the subject are presumed to be those of internal processes (which cannot be directly observed by the experimenter). The experimenter, on the other hand, is acquainted with the observable operations in systematically presenting stimuli to the participant. If the verbal reports are consistent with the variables manipulated by the experimenter (for instance, if the experimenter in a number of trials increases the vibrational frequency from 100 to 200 cycles per second and the observer consistently reports "pitch higher"), the experimenter may infer that the subject has separated one internal event from all the others. Thus the verbal report by an observer of his internal processes does not have to stand on his authority alone.

With refinements that need not concern us here, it becomes defensible that psychologists can define perceptual constructs in terms of experimental operations, and the whole procedure is verifiable by others.

Tolman's Purposive Behaviorism—Picking up the cue from the methodology of operational definitions also was Edward C. Tolman of the University of California. Tolman attempted to bring purposes of an individual within the province of behaviorism.¹⁴ One of the many problems he attacked was: Is it possible to define purposes (goals of an individual) in objective terms? In so doing,

we may ask whether or not it is possible to avoid any implication that a future event determines a present event.

Intervening Variables.—Tolman's approach primarily was that of an animal psychologist. If a white rat learns to run a maze in a specific, identifiable way there are many necessary conditions for the performance. Food in the box at the end of the maze, correct and incorrect turns, the shape of the alleys, and the like are examples. One can determine experimentally the necessary conditions by removing or varying them in degrees and noting the change in the way the animal performs. If the behavior is disrupted, there are grounds (such as the methodological principle of difference) in terms of which it may be inferred that the factors changed were necessary conditions for the identifiable performance.

By such utilization of experimental inference, Tolman proposed standard experiments by which variables within an animal could be defined.¹⁵ These internal variables that influence the response of a given organism to a given stimulus situation he called intervening variables. Among those he considered were demands, appetites, differentiations, motor skills, hypotheses, and biases. The first one, demands, will be used to illustrate the methodology.

The standard experiment for defining a demand would be somewhat as follows. The maintenance schedule (feeding times) would be the manipulated variable. Systematically varied would be the time elapsing between eating a prescribed diet and the moment when a white rat of a stipulated group is put into a standard maze. The only variation inferred to occur within the animal under the conditions would be a variation in demand for food.

Vicarious Trial and Error.—Differentiation of stimuli by an animal is set up as a necessary condition if a given behavior (in contrast to other possible behaviors) is to occur. In terms of any present behavior, the stimuli presumed to be differentiated are either past or present. If a concept of purpose is to be admitted on objective grounds, we need some kind of evidence that an object or event related to a demand (a) was previously encountered at the conclu-

sion of the behavior the animal now is exhibiting, (b) is not now present, and (c) is a necessary condition for the behavior.

The object or event is a goal that will be encountered by the animal if he behaves in a certain way. If he does not behave in the prescribed manner, he will not reach the goal.

The experimental conditions would have to be such that an interpretation on the basis of demands producing a forward-going behavior (so that sooner or later the animal arrives at the goal if he keeps moving) is not sufficient. A differential behavior of some kind, for which any present stimuli could not be inferred as an occasion, is required.

Tolman utilized the concept of vicarious trial and error at a choice point in a maze. A choice point is that part of a maze at which a turn in one direction is correct in terms of the goal and a turn in another direction puts the animal in a blind alley. During the learning to run a maze, Tolman had observed that the white rats upon approaching a choice point exhibited "lookings or running back and forth." Muenzinger termed the behavior "vicarious trial and error."¹⁶

The formal design of a possible experiment, in which vicarious trial and error would be an indicator of a goal as a necessary condition of a maze performance, would be somewhat as follows. A white rat is trained to run through a maze, learning to follow consistently a prescribed sequence of left and right turns at successive choice points. Whatever vicarious trial and error behaviors he exhibits at choice points are eliminated. The animal reaches the point where he performs without error, each time eating food at the conclusion of his journey through the maze. On a subsequent trial, it would be predicted that the animal would again perform correctly and without hesitation at any choice point. But a change is introduced into the experiment. The food at the end of the maze is removed, and the animal runs through the maze once more. What would be predicted for the subsequent trial?

If the goal (food for an animal with a demand for food) is not a necessary condition for the maze performance, then the animal will perform in the same manner as he did when the food was present. If the goal is a necessary condition, then the animal will change his

performance, and it is presupposed that the change will be revealed through vicarious trial and error behavior at the choice points. Upon the basis of experiments similar to the one just described, the latter would be predicted.

Such a prediction would imply that there was a causal relationship between the removal of food and vicarious trial and error, and we would run into trouble if we thought of the relationship as a direct one. If, however, we should treat the removal of food as a cause of a change within the animal (an intervening variable), we can think of the goal as a present state within the animal. If the goal as we observe it is changed, the correlated intervening variable is changed, and in turn the behavior is altered.

Hull's System of Behavior.—Clark Hull of Yale University has formulated a theoretical system of behavior, starting from a small number of primary principles and definitions.¹⁷ From these principles and definitions, he has deduced according to logical rules a considerable number of theorems and corollaries. The theorems or corollaries, when correlated with experimental operations, are predictions of what will happen in an experiment if the theory is correct. They are put to the test of experiment, and if the theoretical predictions are verified, the theory is upheld. On the other hand, if the predictions are not verified, some revision of the theory can be made.

Hypothetico-Deductive Method.—The procedure used is called the hypothetico-deductive method. The propositions of the theory are regarded as hypothetical in the sense that they are continually under the controls of (a) logic and (b) experimental observations. From the set of hypothetical propositions, other propositions can be deduced. The system aims at quantitative precision, and as such it cannot be summarized in a few paragraphs. We can, however, get a brief glimpse of the methodology in one instance if we can take a few liberties for our purposes.

Habit Strength.—A habit, in Hull's system, is conceived as a theoretical construct with a referent in an after-effect within the indi-

vidual, consequent upon a number of factors connected with the reinforcement of a stimulus-response sequence. Reinforcement of a stimulus-response sequence may be defined broadly in terms of need-reduction. In a given experiment there is assumed to be an initiating or occasioning stimulus, and also a need or drive. A primary drive is stated to be consequent upon a need, such as hunger. Food need in turn is a function of observable conditions, and it can be measured in terms of the number of hours elapsing since the individual last ate food.

Thus defined, a habit is an intervening variable related to observable conditions of the experimental situation and also to observable responses of individuals. On the antecedent (stimulus) side, habit is defined operationally. On the consequent (response) side, habit and the behavior leading to reduction of a need stand in the relation of a one-one empirical law. It may be interesting to note that habit is not defined in terms of behavior alone. We can run into trouble if without experimental grounds we would infer the strength of a habit from, say, a way in which an individual ate the food at the completion of the S-R sequence. On the other hand, if operationally defined in terms of antecedent conditions, it would be possible to establish an empirical law between variations in habit strength and variations in eating behavior. This done, we could infer habit strength from the behavior in terms of the law.

Hull quantifies habit strength on the basis of the number of reinforcements, and the result is a simple positive growth function. When graphed, it may be regarded as a learning curve.

The manner in which Hull performs deductions and puts a corollary of the theory into form for experimental testing may now be illustrated.¹⁸ He offers as his first corollary:

I. The shorter the delay in reinforcement, the steeper becomes the rise of the associated curve of learning.

Taken by itself, this statement cannot be put up to experimental observation, since the curve of learning represents changes in habit strength, and habit strength is an unobservable intervening variable. Hull then brings in a principle other than the relation of habit strength to the number of reinforcements, namely, that the greater

the habit strength, the shorter is the reaction latency, or the time elapsing between onset of stimulus and onset of response. He does not use the relation of habit strength and the number of reinforcements because in the experimental test he plans to hold the number of reinforcements constant, varying the time after the completion of the S-R sequence and the reinforcement of the behavior.

Combining the first corollary with the principle that the greater the habit strength, the shorter the reaction latency, Hull derives a second corollary:

II. When a reaction is reinforced after a short delay, the time required to execute the act will be less than that required to execute a comparable act which has had the same number of reinforcements but in which the delay of the reinforcements has been longer.

A number of experiments confirmed the second corollary

Lewin's Field Theory.—Hull's system of behavior has been developed in terms of stimulus-response sequences, and experimental inference of states such as needs, drives, and progressive after-effects of previous S-R sequences, including reinforcements. Many of the relationships studied have been those of successive events, pertaining both to (a) sections of a present S-R sequence, and (b) the dependence of one occurrence of an S-R sequence upon another, mediated by after-effects within an individual.

Life Space.—Kurt Lewin's approach, while not challenging the correctness of the kind of successive relations examined by Hull, differs from the latter in that he provides for a centering on the events which behaviorists would regard as a stimulus-response sequence. Where and what are the events immediately prior to and concurrent with the behavior of a person? They are located within the individual, and Lewin refers to them as the life space of a person at a given time.¹⁹ The life space of a person is described in terms of the way in which the person himself and his present environment exist for him. What an individual does at any given time is dependent upon these central events, his momentary life space.

By definition, the life space is represented as those, and only those, events affecting behavior immediately following or concurrent with it. If there are any events within the individual upon which the behavior does not depend, they are not a part of the life space. Also, by definition, the life space is represented as those, and only those, physical, social and somatic processes which affect the internal events that in turn affect behavior.

Laying down such a rigid definition of life space does not mean that Lewin's system is not amenable to experimental testing. The definition simply controls what shall or shall not be represented in the life space of an individual. If, in a psychological experiment, it would be determined on the basis of experimental inference, that an object did not have influence upon the behavior of an individual, it would not be included in the description of life space. Should it be experimentally determined that the object did affect behavior, it would be included.

In his exposition of his theory, which he regarded as methodological, Lewin leaned heavily upon inference from behavior in a given situation. If his statement that "what is real is what has effects" can be interpreted to mean that after behavior has occurred, we infer back to the nature of the life space, the grounds for such an inference would be a law or set of laws expressing a one-one causal relationship between the momentary state of the individual and the behavior under consideration. In turn, we would look for the grounds upon which the laws were established prior to the individual case subsumed under them.

Valences.—An important concept in Lewin's theory is termed *valence*, which is a property of objects in the psychological environment. Objects possess either positive or negative valence for the person.²⁰ One that is agreeable to and attracts an individual toward it is said to possess positive valence. One that is disagreeable to and repels an individual is described as having negative valence for him. If neither of these conditions obtains, the individual is indifferent to the object. These definitions of valences are rigid. The empirical problem is the determination of which valence for an object, if any, holds in an individual case.

Lewin provided for such a determination without relying solely upon behavior as the basis of inference, which would assume a set of laws relating valences and behavior. He declared that the valences of environmental objects are correlative with the needs of an individual. An independent determination of the momentary state of the needs of an individual could provide the grounds for an inference pertaining to valence of objects, if the following holds: (a) A need in an unsatisfied condition determines a positive valence for any object that would satisfy that need, (b) a need in a satisfied condition results in indifference to any object that would satisfy the need, and (c) a need in an oversatiated condition determines a negative valence for any object that would satisfy the need.

Topology and Vectors.—Lewin made use of correlating definitions by means of which he related the concepts of life space of a person and spatial representations of those concepts. He developed a system of drawing pictures by which the spatial relations of a person and objects in his psychological environment could be represented.

Representations such as these are called topological. In the picture symbolizing the life space the valence of objects was represented by a plus sign for positive valence and a minus sign for negative valence.

According to Lewin's system, the valence of an object determined the direction of behavior. In representing the direction by an arrow, Lewin introduced the concept of a nonmetrical vector, which he regarded as a psychical field force proceeding from an individual toward an object with positive valence. It should be emphasized that his pictorial representations were conceptual and they were intended to systematize the life space of an individual. Otherwise, one might incorrectly interpret Lewin as representing a physical situation in which some kind of ray proceeded from an individual toward an object.

Barriers.—In this brief consideration, we shall consider one more out of many other concepts introduced by Lewin. If an object possesses positive valence with sufficient strength in the setting of other psychical forces, the individual will act in accordance with the

vector. In life situations, the individual may encounter difficulties in attaining his goal. Such difficulties as exist for him are represented as barriers, lines drawn between the object with positive valence and the person. A barrier may be physical, such as a fence, or social, such as a prohibition by other people.

CONCLUDING WORD

Psychologists like Hull have been careful not to let their theories run too far ahead of experimental evidence now available. Scientists do not claim to treat all of the problems of their fields, however demarked. One has to make a decision between (a) leaning toward a rigorous, quantitative but at present relatively restricted system of behavior and (b) being satisfied with a less rigorous, more qualitative and perhaps more dramatic development of the concepts of psychology. In one sense the latter sets the problems for the former more conservative approach. Psychologists who are eclectic, or who subscribe to a dialectical experimental approach, are inclined to compromise these extremes. Most psychologists probably have more confidence in the conservative approach for the long run and still they believe that the demands of society upon psychology should be recognized by action with the best means at our disposal now. If he is continually guided by the research point of view, devoting his efforts to the sharpening of concepts and toward greater precision in his methods, the psychology student of today accepts the challenge of the many unsolved problems of human behavior.

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